Academy of Nutrition and Dietetics Foundation

Exploring Malnutrition Through the Lens of Systems Thinking

A webinar for the Academy of Nutrition and Dietetics Foundation

Have you ever considered how malnutrition is affected by global food and water systems, or how food systems are affected by a variety of key players who each have their own worldviews? Through this presentation you can unlock a greater understanding of **malnutrition** in a global context through the viewpoint of systems thinking.

This webinar series invites you to broaden your awareness of how our food and water systems impact ecological, agriculture, economic, socio-cultural, and health outcomes. This webinar also introduces key concepts of **systems thinking**, which refers to the principle that the whole is greater than the sum of its parts. Even if our daily work focuses on a specific area, systems thinking encourages us to not lose sight of the larger context of the whole system.

The webinar introduces terminology that helps us describe systems. A **worldview** is our conception of the world around us. Your worldview is dynamic, fluid and impactful. The differences between our worldviews can at times be obstacles to partnership and alliance throughout the subsystems of our global food system, but oftentimes, opposing views can strengthen these working relationships creating more powerful, impactful developments.

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A system also includes **key players**. Identifying key players of a system is an important first step to understanding the system itself in order to make the biggest impact. Key players in our food system include food producers, processors, distributors, retailers, preparers, consumers and waste management.

Areas of impact include ecological, economic, socio-cultural, health and agricultural. Decisions we make as nutrition and dietetics professionals affect these areas in some way, even when not directly obvious. Analyzing possible impacts by understanding the cause-and-effect relationship of actions taken by key players is vital to effectively planning a system-wide operation.

This webinar includes two **malnutrition case studies**: one centered in the United States and one centered in Lao in Southeast Asia. Based on these case studies, participants will learn to complete an **impact analysis** in order to think through systems-level impacts of nutrition interventions on ecological, economic, socio-cultural, health, and agricultural outcomes.

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is a professor at the University of Wisconsin - Stevens Point and also serves as vice president for the Society of Nutrition Education and Behavior. She conducts research on sustainable and resilient food and water systems, food security, and community nutrition.

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is a faculty member at Oregon Health and Science University in the Human Nutrition Graduate Program. She is the Country Director and Clinical Nutrition Instructor for the Lao-American Nutrition Institute (LANI). She works with the Lao Ministry of Health and government hospitals to train clinical nutrition specialists. In addition to her work in global malnutrition, she also has expertise in pediatrics, oncology, and metabolic disorders.

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Webinar with Jasia Steinmetz, PhD, MS, RD
and Joanna Cummings, MS, RD, CNSC
Wednesday, May 1, 2019

Future of Food Initiative

The Sustainable, Resilient, and Healthy Food and Water Systems curriculum was developed through the Academy of Nutrition and Dietetics Foundation's Future of Food Initiative

- Started in 2012
- Funded by an educational grant from National Dairy Council

Goal of the initiative: sustainable food systems and a safe and nutritious food supply for the growing world population

Key people:

- Amanda Hege, MPH, RDN, LD, Project Manager
- Marie Spiker, MSPH, RDN, Healthy & Sustainable Food Systems Fellow

Food and Water System Thinking

Steps in sustainable and resilient system analysis

System Thinking Approach

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The whole is greater than the sum of its parts:

- The essential properties of an organism, or living system, are properties of the whole, which none of the parts have.
- Essential properties arise from the interactions and relationship among the parts.
- These properties are destroyed when the system is dissected into isolated elements.

Systems

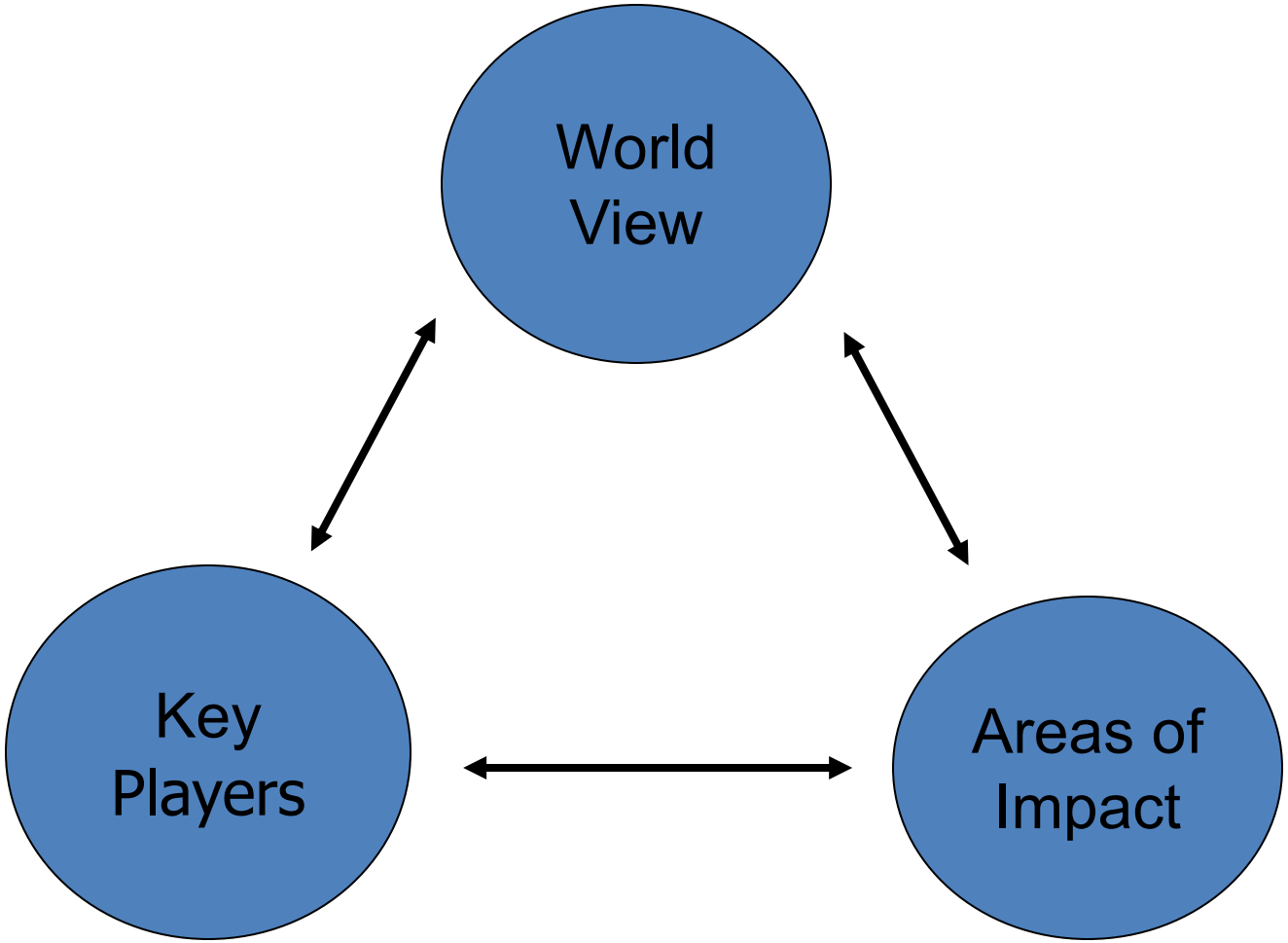
- **Interlinked** (nested, dependent)
  - Part of larger systems and can also be disaggregated into smaller subsystems
  - Consider your human body and all the subsystems: nervous system, circulatory system, digestive system, etc.

- **Dynamic**
  - No system is static
  - Many possibilities for both problems and solutions

Systems Thinking

- Note basic principles of organization
- Note the context of the larger whole
  - Unlike reductionist thinking which tries to understand by dissecting the part into smaller and smaller units of observation, systems thinking looks to understand the whole from the parts
- Understand subsystems →pattern and relationship within a larger system

Systems Approach



World View

- Awareness of the individual's perspective of the world
- Awareness of their relationship to the world and to each other
  - How connected am I to species, people, spirituality, etc.
- Awareness of different worldviews
  - Not everyone sees the world in the same way (difference by age, sex, culture, religion, experiences, emotions, values, beliefs, etc.)
- Awareness of the development of worldviews
  - Each person decides on changing their worldview
    - The Earth is round.
    - Children are no longer property.
    - Women have the same brain capacity as men.
    - Humans can impact the planet's ecosystem balance.

World View

- No one escapes having a world view, so recognizing our world view helps us to consider the beliefs that we have about the world and how these differ from others.

- Often, we use our world view to make value judgments about other cultures or people.

- In systems thinking, we need to consider differing world views as part of critical thinking and problem solving.

Key Players

- Directly/indirectly involved in an issue
  - *Examples of those directly involved:* farmers, food supplier & consumers
  - *Examples of those indirectly involved:* food processors, USDA, waste companies, etc.

- Equal power is assumed in analysis
  - This levels the influence and fosters communication and understanding.

- Valuable to the system
  - In model of systems thinking *all* are considered to be valuable and equal

Each Key Player …

- Has their priorities.
- Is affected to a different degree by the system.
- Brings strengths and weakness to the system.
- Are barriers or enablers of change.
- In general:
  - To consider key players in systems thinking we need to know their priorities and how the issue affects them.
  - We also need to consider how they impact others within the system.

Steps in Applying a Systems Approach

- Reflection on individual worldview
- Identification of key players
- Identification of areas of impact
- Integrate

Food & Water Systems or Foodways

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Traits of food and water systems:

- Heterogeneous
  - Produced by the confluence of multiple forces and contexts in society
- Reflect and shape social inequity
  - Who controls the "right to food" and "right to water"?
  - How is access determined?
- Dynamic
  - Reproduced and yet changed

Key Players in Food System

- Input companies (seeds, fertilizers, pesticides, etc.)
- Producers (farmers, fishermen, etc.)
- Processors
- Distributors
- Retailers (Grocery stores, convenience stores, etc.)
- Preparers (restaurants, schools, etc.)
- Consumers
- Waste management

Areas of Impact

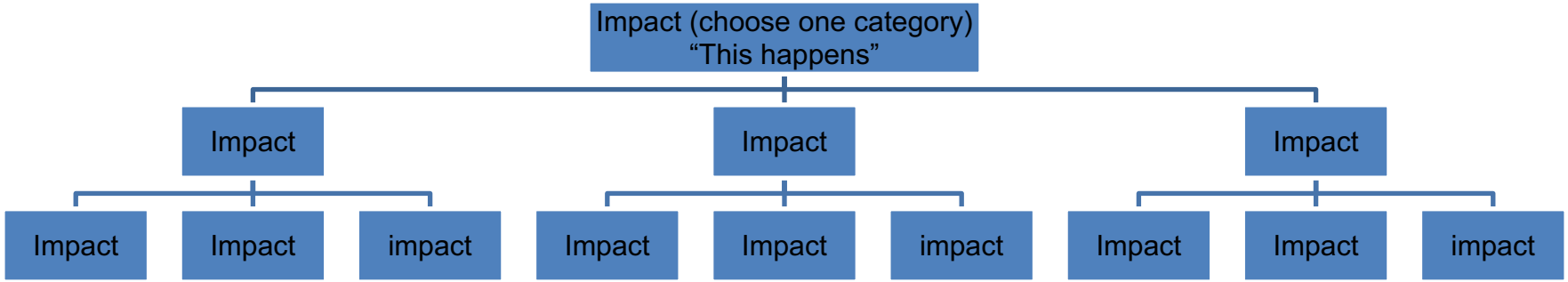
- In our system analysis we want to think about impacts in different areas or domains:
  - **Ecological**
  - **Economic**
  - **Socio-cultural**
  - **Health**
  - **Agricultural**
- Key players can be affected in most of these areas, but some have more influence in one versus another.
- Areas of impact are considered to be equally important, regardless of the value assigned by a key player's world view.

Areas of Impact Objectives

- Long- and short-term impact in an area
- Interconnectedness of the areas
- Structuralist and social constructivist perspectives
  - There are two views of the relationship between social patterns (area of impacts) and human behavior.
    - Structuralists: social patterns → human behavior
    - Social constructivist: human behavior → social patterns
  - "Agency": navigating and shaping social and cultural landscapes both collectively and individually

Impact Analysis Steps

- **Choose one area of impact** (e.g., ecological)
- Identify a **primary impact** (something happens)
  - Identify a **secondary impact** ("If this primary impact happens, then this happens…")
    - Identify a **tertiary impact** ("If this secondary impact happens, then this happens…")



Tips for thinking through impacts:

- Think from the perspective of different key players
- Consider positive and negative impacts
- Consider short and long-term impacts

Case Study #1

Malnutrition in a low-resource country

Case Study #1

- Phat, a 20 month old girl, lives with her mother, father, grandmother and 4 older siblings (3, 5, 6, 9 yrs) on a small farm in the northern part of Vientiane province in Lao PDR.

- The village has strong bonds between all members and is very communal with each family helping the other.

- The family home has electricity but no running water. It is about a 2-hour scooter ride to the closest provincial hospital.

- Collectively, the family makes about $200 USD per month, of which $90 goes towards school fees for the 3 older children.

Case Study #1, continued

- The typical daily meals consist of sticky rice, bamboo shoots, greens, mushrooms they forage from the forest, small fish raised in the rice fields, frogs, insects, and mangoes.

- Food becomes scarce during rainy season because vegetables cannot grow, most fruits are a dry season crop, and the rice has been planted and is growing but will not be ready for harvest until the end of rainy season (about 5-6 months).
-
- Occasionally the family will have chicken, but this is rare as the family makes money by selling the chicken. When the father has time, he hunts in the forest for small animals such as geckos, squirrels, bamboo rats, voles, and snakes.

- The diet changes with the season and the family typically eats the same foods for several months in a row.

Case Study #1, continued

- Phat's father works the farm and at other odd jobs as he can find them.
- The farm produces rice, corn, local greens (morning glory, mint, herbs).
- The family is able to sell rice and eggs in the markets but can only get these foods to market if the two oldest siblings miss school and take the food to sell at market.

Case Study #1, continued

- Through government support, rice production had increased in recent years with more rice being grown for the commercial export market. Phat's father has been able to expand his rice fields over the past five years and has converted some of the vegetable garden to a rice field.

- Recently, growing seasons have become more unpredictable with climate change and rainfall patterns are erratic. Last year the family lost most of their rice crop due to flooding. New varieties of rice that are drought or flood resistant are becoming more available, but costs more than traditional varieties.

- The family has a water buffalo that used to work the rice fields but now with electric tillers from China, the buffalo is a "savings" account, worth about $1200 USD or about 6 months of income for the family. The family would only sell or slaughter the buffalo if they needed money or for a special occasion, such as a wedding or festival for the village.

Case Study #1, continued

- Phat's mother is illiterate and left the farm a few months ago to become a "mae ban" or domestic worker/housecleaner in the city to help make money for the family. Phat's mum tries to come home every couple of weeks but this is difficult due to transportation costs and she is unable to take much time off work.

- It is now the end of dry season and food stores are running low, especially since the family lost most of their rice last season.

- For the past few months, Phat's grandmother has been taking care of Phat, feeding her rice porridge (khao piak) and meat from animals she can find in the forest. Over the last three weeks, Phat has not been eating well. She is irritable, unsettled and prefers to be left alone. She will not move unless her grandmother carries her.

Case Study #1, continued

- Last week the grandmother became worried because Phat's stomach was distended. She gave her an enema. That night Phat passed a few loose stools but remained restless and lethargic. She drank water quickly and promptly vomited. The next morning, the grandmother took Phat to hospital on the neighbor's scooter – a 2-hour journey over bumpy dirt roads.

- By the time they arrived at the hospital it was nearly 11:00am and the Emergency Department and Outpatient Pediatric wards were packed with people. Phat was very weak and unable to walk at the hospital. After waiting in line for an hour, Phat was examined and admitted to the Pediatric ward.

- Upon admit, Phat was very thin with visible muscle and fat wasting on her shoulders, ribs, and upper arms. Her legs and feet were swollen with edema and when the nurse pressed on her ankle the depression from her thumb remained. The skin on her feet was dark and cracked. Her stomach was distended. Her hair was thin, lighter at the roots and pulled out easily. She plotted at -3SD on the weight-for-age growth chart. Her pulse was weak and fast.

Case Study #1, continued

- The grandmother could not stay at the hospital because she had to go home and care for the other children. Extended family members stayed in shifts to care for Phat.

- The grandmother returned two weeks later and the doctors recommended Phat could go home. She had gained weight over the last week of her stay, her edema had resolved, and she was eating well but she was anemic (Hgb <9mg/dL).

- Phat was still malnourished and significantly underweight so the nurse gave her 24 packets of Plumpy'Nut, 2 bags of fresh soy milk, and a multivitamin/mineral powder mix to add to the porridge she eats at home. The nurses recommended Phat eat more eggs, vegetables, and more fat. They also recommended she eat more meat – such as beef, liver, and dark meats to help increase her iron.

Case Study #2

Malnutrition in the United States

Case Study #2

- Jack, a 3-year old boy, lives with his single mother and 2 older siblings (4 & 7 years) in a small apartment in the suburb of Seattle, Washington. It is about a 25-minute bus ride from the apartment to the WIC office.

- Mom makes $2000 per month and does not have any family or support to help her. Jack and his 4-year old sibling are receiving WIC benefits.

- The oldest sibling, a 7-year old girl, was on WIC until she aged out of the program. She has always plotted in the 90-95%ile in weight-for-age and BMI consistent at the 75%ile, whereas Jack is <3%ile and has triggered in the WIC system as “high risk” for malnutrition.

Case Study #2, continued

- Seattle has been growing its tech industry, which has put pressure on the housing market, and the family had to relocate last year due to the rise in rent for their 2 bedroom apartment.

- The apartment has one bedroom with a pull-out couch where Mom and Jack sleep and an efficiency kitchen.

- Mom has complained to the landlord about the mold around the windows and is concerned with the frequency of ear infections for the older children and her cough which persists but there are no other housing options

Case Study #2, continued

- Mom reports she consistently uses the WIC money to purchase food for the children and admits she gives it to all the children as it is “too hard to tell one of them not to eat this food or that food when everyone is hungry”.

- Her SNAP benefits change with her work schedule and unpredictable child-support payments and they rely on the nearest food bank during the last week of the month.

- Last summer, the family received $35 in WIC farmers’ market voucher, of which she was able to spend $20. In June, she hopes to find a eligible farmer’s market closer to their apartment.

Case Study #2, continued

- She states meal times are the hardest time of day for her because her oldest daughter finishes her plate and will also eat any food left on the plates of her younger siblings. Mom says she is very happy to see her older daughter eating and praises her for eating so well each meal.

- Mom struggles to get Jack to eat anything at meal time, and she has force fed him many times to make sure he ate something that day. Mom has become so frustrated lately that she now makes 3 evening meals, one for each child, in an attempt to appease them all and get Jack to eat. She has tried to get a "routine" down but struggles due to changes in her work schedule, children getting sick and commute from daycare and school to home, and exhaustion.

Case Study #2, continued

- Mom gets up at 3:00am each day to go to her first minimum wage job. She wakes the children by 3:30am and they are in day care from 4:00am until 6:00pm at night when she gets off her second job.

- The oldest two children are on the free and reduced lunch program at school. Day care has set meal times, schedules, and foods and is a very structured environment compared to meals at home. Mom reports Jack does not eat well at day care either.

Case Study #2, continued

- Access and time to shop for foods is a challenge for mom. The closest grocery store to their neighborhood is a 30-minute bus ride. There is a food pantry access near WIC office, but this is near the grocery store and not convenient to access.

- The office is open from 8-4pm, Monday – Wednesday and Friday, and from 8:00-5:45pm on Thursdays.

- She is also worried about using the coupons at the market as her first and only experience at the market proved stressful and overwhelming. She was not familiar with how to shop at the market, did not bring her own bags, heard some customers made side comments about her WIC coins, and when she arrived home she did not know how to cook or prepare some of the vegetables.

Case Study #2, continued

- Mom knows having the children eat a more diverse variety of vegetables is good for them but struggles with overcoming the barriers to access these foods.

- On the days when there is a WIC an appointment scheduled mom has to take off work from at least one job. As she sits in the waiting room filling out another form, she calculates her lost wages and wonders how she will pay the electric bill this month.

Case Study #2, continued

- Over the past few weeks, Jack has begun to drink more milk, so mom has offered this to him anytime she can throughout the day and encouraged daycare to “continually offer him milk” as she sees this as “at least some type of nutrition” he will not eat. Mom is happy Jack is drinking milk as she used to feel guilty wasting it because the family receives so much of it through WIC it had been a challenge to consume it before it spoiled.

- At the most recent WIC appointment, Jack’s hemoglobin is <10 mg/dL and he is diagnosed with anemia in addition to being high risk for malnutrition. Mom is encouraged to feed him more red meat each day to help bring up his iron stores and to reduce the amount of milk he is drinking as this may be a substitute for food.

Assignment:

1. Identify the key players, both direct and indirect for your case study.

2. For your case study, think about the question posed for your study.

3. Conduct an impact analysis using the following format: If (your study question) happens, then this primary impact happens.
   - You will conduct one primary → one secondary → two tertiary impacts
   - Repeat this analysis for each of the assigned areas of impact.

Finished Product

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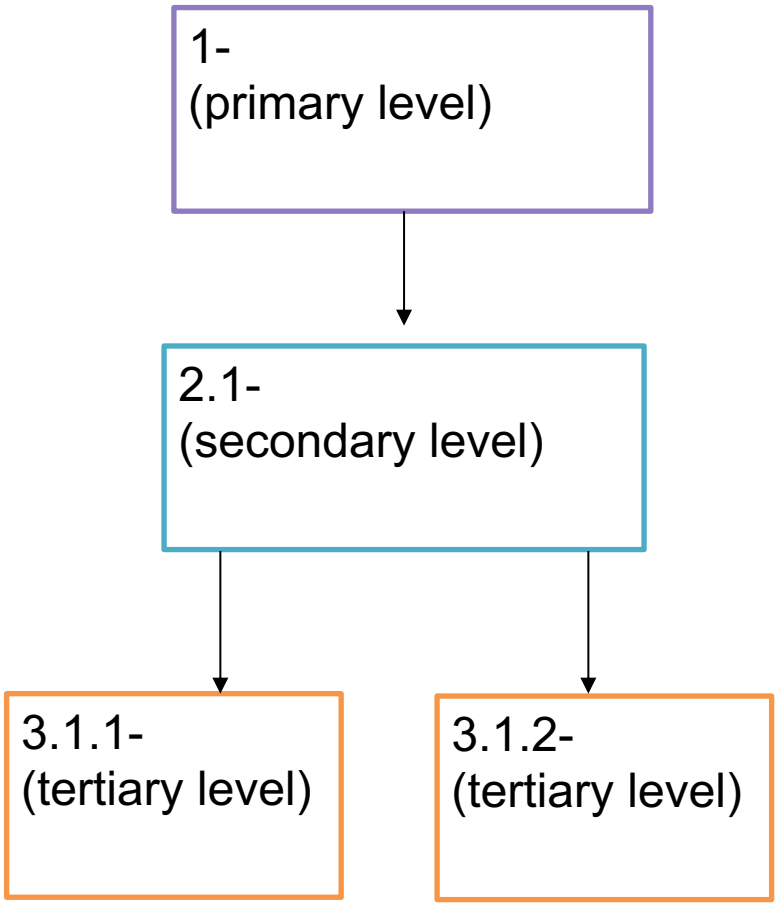
Ecological Impact Analysis



Impact analysis for other assigned area