

GENDER & SEX

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CONNECTS WITH:

Participation and Research – Health – Complexity - Ethics

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INTRODUCTION: A WORD OF WELCOME!

Welcome to the Gender & Sex ecohealth module! Thanks so much for joining us. We hope you will find this module educational, helpful and enjoyable.

AIMS AND OBJECTIVES

After working through this module the whole team (instructors and students) will be better able to:

- Understand the concepts of sex and gender on their own, what the concept 'gender↔sex' means and why we are starting to see it more.
- Talk about gender↔sex linkages to help break us out of our experiential and disciplinary silos, and our black-and-white thinking.
- Learn, see and be able to describe clear examples where gender↔sex are independent and dependent determinants of human, animal and environmental health. This can be in our everyday lived realities, in the learning environment, or in the research context.
- Imagine how to better integrate and operationalize gender↔sex in your work, both methodologically and theoretically. (Work with the teaching team to plot these changes.)
- Develop a critical point of view on gender↔sex, recognizing its profound applicability and also its limits.

GUIDING QUESTIONS

Note: *These questions can be used as reflective or discussion prompts throughout the entire course.*

- Is there gender↔sex in this?
- Where is gender↔sex in this?
- What temporal and spatial scales are you seeing these factors at work in? (Family, Neighborhood, Municipality, Province, Region, Country, Continent?)
- Why might gender↔sex be important or relevant?
- What have I (male) understood and misunderstood about the realities and perspectives of you (female)? Vice-versa.
- How might I be able to get at or approach gender↔sex: Operationally? Analytically? Statistically? Conceptually?
- What implications might getting at gender↔sex have for my current research?
- What implications might getting at gender↔sex have for the direction of my future research?

MODULE 5: GENDER

- What implications might getting at gender↔sex have for the community I am working in and with?
- What implications might getting at gender↔sex have for policy?
- How might a student who identifies as another gender, respond to my work?
- What is preventing me from taking up gender↔sex in my work?
- What is supporting the inclusion of gender↔sex questions in my work?

KEY CONCEPTS OF THIS MODULE

- | | |
|-----------------------|----------------------------------|
| • Sex | • Situated Knowledge |
| • Gender | • Marginality/Invisibility |
| • Gender↔sex | • Power |
| • Equity and Equality | • Scale (Temporal and Spatial) |
| • Difference | • Environments (Living and Work) |

Session Topics

Here are some titles of sessions you could design and deliver on the theme of gender↔sex . The last one of these is developed in further detail later in this module.

1. THE BIOLOGIES AND SOCIOCULTURES OF SEX AND GENDER: HUMAN, ANIMAL, PLANT.
2. RESEARCH METHODS I: QUANTITATIVE DATA ANALYSIS OF GENDER↔SEX
3. RESEARCH METHODS II: QUALITATIVE METHODS AND ANALYSIS OF GENDER↔SEX
4. RESEARCH METHODS III: MIXED METHODS
5. WAYS OF KNOWING ACROSS SEX AND GENDER DIFFERENCES: EPISTEMOLOGY
6. VALUES ACROSS SEX AND GENDER DIFFERENCES: ETHICS AND POLITICS
7. **GENDER↔SEX AND HEALTH (THIS MODULE IS WORKED-UP IN SKELETAL FORM, BELOW)**

DIRECTIONS

Practical Tips for Scaling the Module Up or Down

Gender & Sex as a major component in a course (2 or more sessions):

- Include several of the sessions listed above.

A short introduction to Gender & Sex (1-2 hrs):

- Use parts of this module as required reading and facilitate a discussion around relevant issues and ideas.

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- The team could work through the definitions of “sex” and “gender” discussed in this module and then foster an open dialogue on gender↔sex linkages in their own research areas.

INTEGRATED WITHIN THE OTHER MODULES

- Assign something from this module as required reading for the course.
- The team could ask any of the “Guiding Questions” at a given moment in another module. (This brings gender↔sex from being an implied category to one that is explicitly discussed).
 - During the course planning phase, take some time to flag the moments in the course where it would be effective to make a connection with sex and gender. This could be as simple as asking a question, or making a brief statement that draws attention to the relevance of sex and gender to the topic at hand.
- Add gender↔sex as an explicit element in **APPRECIATIVE APPROACH [Participation and Research]**
- Use “Guiding Questions” as a round in the **POSTER SESSION [Transversal Activities]**
- Adapt capacity-building exercises from the **PARTICIPATION AND RESEARCH** module, substituting ‘gender’ for the gender-generic categories of “people” & ‘stakeholders.’
- Adapt the map making exercises [in the **Complexity Module**] to gender↔sex. For instance, ask people to draw maps of where they go, what they do, who makes up their ‘community’, what they own, etc.
- Use “Guiding Questions” as a layer in a **SOCIAL NETWORK** session.
- Make sure there are girls and women, boys and men, in **ROLE PLAYING** exercises to draw out the age-indexed differences in sex and gender. Afterwards, discuss whether the roles managed to bring out something true or not. This works well in **STAKEHOLDER MEETING** role-playing.

BUILDING CAPACITY IN THE TEACHING TEAM TO DELIVER A MODULE ON GENDER↔SEX

This section is designed to address the teaching team before the course is designed. It provides some points for reflection on why gender↔sex sometimes falls by the wayside, and *what might be done* during the preparation stage of a course to ensure that doesn't happen. Some suggestions are given for ways to increase participation, build confidence and develop capacity in the teaching team for tackling the topic of gender↔sex .



LESSONS LEARNED FROM FOUR YEARS OF ECOHEALTH TEACHING IN CANADA

Even when scholars with experience or expertise in gender↔sex research and teaching are on-hand, and the teaching team is committed to ensuring that gender↔sex is included among the sessions in an ecohealth course, we have discovered it can still be very difficult to actually get any substantive gender↔sex content into the course!

WORKING QUESTIONS FOR THE TEACHING TEAM

- Would you feel comfortable teaching a gender↔sex module, or part of a module? Why or Why not?
- What do you feel you have to offer this topic and this pedagogical work? From a scholarly perspective? From your personal experience?
- What do you see or know about gender↔sex from where you are situated? What assumptions are you bringing to the table? What messages are those assumptions conveying?
- Look back at a formative experience in your academic or professional development that relates to gender↔sex (PhD fieldwork, medical school, seminars, a keynote speaker's message that really hit home, etc.) How might that situation have been different if you were to 're-write' it with a protagonist of a different gender?

REFLECTION: WHY GENDER & SEX DOESN'T GET INCLUDED?

- 1. UNEASE.** This topic is more political than most covered in ecohealth courses. Instructors may be personally uncomfortable talking about these questions. This unease may also be felt among participants in stakeholder meetings, among community members at roundtables, and among the students coming to the course.
 - Dealing directly with this unease as a teaching team will help you to avoid gender↔sex being pushed to the margins.
- 2. INVISIBILITY.** One strange thing about gender↔sex is that it is everywhere and nowhere. Folks think it's already "in" discussions because it's all around us. Yet, in terms of explicit, careful scholarly uptake of the questions, and using the research available to frame and help answer those questions, it actually doesn't make it "into" our conversations. Being visible isn't the same as being adequately treated. There are feminist scholars around the world working in every imaginable subject area; natural science, social science, the humanities, and this work has been done for hundreds of years. And yet, a common experience is to find that gender↔sex is absent from the indices of the standard, classic texts we read and teach, whether art history, social network theory, mink farming, endocrinology or public policy.
 - As a team, strategize ways in which you can make gender↔sex visible in your course. Consider dividing up and taking responsibilities for a series of actions which will bring gender↔sex explicitly into the course.
- 3. IDEOLOGY.** Sometimes gender↔sex isn't all that relevant or applicable to one's research question or context, or doesn't or shouldn't have as much priority as other factors, like race or economics. There's a challenge around being sensitive and including the axis of sex↔gender where it is often overlooked but should be taken up; versus being overly sensitive and believing, ideologically, that gender↔sex should always be taken up or is always the most productive hypothesis.
 - Discuss as a team how to achieve the right balance for your course.
- 4. "EXPERTISE":** Gender↔sex research and expertise is often marginalized in industry and academia, and this can reproduce itself when a teaching-team is built. Gender↔sex is typically a secondary area of expertise and this has ramifications in terms of workload fairness in a team. Folks who have no background in gender↔sex research or teaching tend to stick to what they know best and retreat to the background when gender↔sex teaching is orchestrated. They do this out of respect for their peers' expertise but what happens is that, just like housework, gender↔sex researchers and teachers (mostly female) end up

doing extra work, or doing the work that gets less recognition in terms of scholarly value. Further, the tendency to defer to those who do have competencies occludes the crucial fact that everyone *does* have experience or some competencies with gender↔sex by virtue of our lives. Everyone can, and should, share in building these questions into the course, and share in grappling with the answers, together.

- Make a team commitment to share in bringing the topic of gender↔sex into your course, and to be attentive to ensuring a fair distribution of the work.

BUILDING GENDER & SEX INTO YOUR COURSE

Early in the Design of the Course:

- Set aside time to have an open-facilitation session among the team of instructors to collectively work through the above reflections.
- Search out course instructors (core or guest) who have an interest and/or secondary expertise in gender↔sex . This might take a bit more sleuthing than finding teachers for other topics. Look at the titles and bibliographies of their publications. If you see *sex* and *gender* in their titles, chances are, this is a scholar who could speak to gender↔sex in his or her area of research, and in general. Don't mistakenly presume this is work that only women are interested in and do, or work that only Humanities' folks do. Men also do excellent teaching and research taking sex and gender into account. As do physicists and chemists. Similarly, don't presume all women are interested in, or do work on gender↔sex . Many female scholars have no gender↔sex questions in their teaching or research. Bring in people for whom these questions are vital.
- Support bringing this topic to the center of the course by modeling active participation on the part of the whole team. This action sends the message that this labour is intellectually important and must be shared.
- **Testimonial:** Ask a team member to speak to the challenges and successes she or he has experienced in trying to work with this axis of analysis in the lab or in the field (for an example, see the testimonial below from a member of the CoPEH-Canada team). This helps to show the rest of the team that such work is really challenging, calls for input and help from colleagues (in the same way any other difficult scholarship would) and showcases feminist research.
- Make time to have an open-facilitation session among the team of instructors to:
 - Address any unease with the topic of Gender & Sex directly.
 - Support critical reflexivity around gender↔sex.
 - Tap into the collective experience and informal expertise in the topics of gender↔sex.

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- Take collective responsibility for continuing to centralize gender↔sex questions.
- You could work through parts of this module together.
- (Other activities which can be adapted for use here are the **‘Keystone Activities #1 ‘Finding Uncommon Commonalities’ and #2, ‘Rules of Engagement Session’ from the Participation and Research module**. Ideas about group cohesion, honest self-reflection, good dialogue and building participation, can be brought into this session.)

Early in the Delivery of the Course: Schedule in feedback time that specifically asks team members and students to reflect on whether and how gender↔sex has been adequately handled in discussions and activities up until this point in the course.

- This could be as simple as a team member, identifying as the Gender↔sex advocate, providing feedback.
- Generate feedback from the group on what, with regards to gender↔sex, you should STOP doing, START doing, and CONTINUE doing.
- You can also use “Guiding Questions” to facilitate an open discussion.

TESTIMONIAL VIGNETTE FROM A COPEH-CANADA RESEARCHER

Several researchers in CoPEH-Canada work in the Amazon and need to include gender in their research. A research study conducted in Ecuador and Peru looking at mercury and hydrocarbon levels in indigenous populations living near oil wells gives a good illustration of the challenges faced in field work when encountering and trying to work with gender roles. Getting women to speak in women-only focus groups during the data collection phase was not difficult, but subsequently engaging them in mixed gender, public activities proved challenging. As part of the research dissemination phase, a play was designed to explain the results and a video was produced for a wider audience (to see the video: <http://vimeo.com/6812936>). Community members acted out the parts of the oil-well, the fish, a fisherman and someone cooking with water. In each performance, we insisted that a woman come up to fetch the water, because this is traditionally a woman’s task. After some prodding from her compatriots, we always ended up with a woman who seemed happy to play the role. We could have tried harder to involve more women as actors from the beginning, but we didn’t want to overstep the social and cultural boundaries. The same problem arose in making the video. We asked several women to give testimony but none volunteered and we thought it more respectful not to insist. Traditionally, men in Kichwa communities occupy public posts, are more vocal at community meetings, and tend to speak better Spanish. This example raises the question of to what extent we should or even could insist on having equal representation in our ecohealth activities? It also suggests that the kinds of gender dynamics and patterns that arise in other contexts, such as the typical classroom, could serve as excellent rehearsal spaces for critiquing and working with what will eventually be encountered in some form or another in the field and vice-versa.

OVERVIEW AND RATIONALE

KEY CONTENT

Question: Why is Gender↔Sex an important component of ecohealth research?

Answer: Answering this question requires that we first get a firm handle on the two key concepts, and how they are connected.

“SEX”

Every living body is marked by what we call *basic sex categories*: male or female. There are male or female gametes, male or female human bodies, male or female parts of flowers. But the more we study sex categories the more we can see it is not a simple story. From DNA through to protein expression, cellular organization, organ systems, phenotypes, and intersubjective chemical cues – all important moments in sex biology – evidence suggests that even this so-called basic biological category (“sex”) involves dynamic, complex, multi-scalar systems of signals, mechanisms and feedback loops.

Why sex categories are (or should be) included as a part of ecohealth research:

- One of the fundamental premises of ecohealth research is that animals, humans and plants are inseparable from the point of view of health. Sex is a fruitful avenue of approach for investigating that premise. Biological sex is a constant and ubiquitous factor in all living systems and it confirms and illustrates how, animals, humans, plants and environments share common ground and are linked across material realities.
- Relations between and among sexed beings (as sexed bodies) is a permanent fact, a constant part of the dynamic of all social spaces; the field, the laboratory, the boardroom, the stakeholder meeting, during theses defences, on granting committees, in the warehouse and in every classroom.
- You can get better science -more focused questions, more profound hypotheses, more interesting and meaningful results, better practical outcomes - when you attend carefully and systematically to sex categories. Cells, tissues, systems, individuals, groups, and even populations are sexed, and these differences can be crucial to the phenomenon under study whether it is a chemical pathway, a pattern of cell proliferation, the impact of technologies on work safety, or different learning and communication styles.

“GENDER”

Like sex, gender is ubiquitous. All cultures – including mammals and social insects – exhibit gendered organization. All bodies, insofar as they are in relationships, are gendered: masculine, feminine, or different admixtures and degrees of these (Driskell, 2011, and Herdt, 1993). Distinct types of behavior, stereotypes, roles, aspirations, affects, sexualities, comportment, style, idioms, imaginations, expectations and narratives are marked as either masculine or feminine. The axis of gender is always present although its power to shape situations and the degree to which it is performed varies enormously in time and place (Butler, 1990). What counts as appropriate masculine attire, for instance, is different at a wedding than in the library. Whether we want it to be the case or not, gender is one of the main ways we identify ourselves and each other. This also seems true of the animal kingdom. Fish, for instance, can switch their gender according to social cues (Kobayashi et al, 2009). The emotional and affective lives of primates and pachyderms are as marked by gender as our own. (See the writings of Dutch primatologist and ethnographer, Franz Vander Waals). We also read gender into inanimate objects and cells, even while we are trying to be objective, such as when we are looking through a microscope! (Martin, 2003). Gender is not a black and white category. It involves a dynamic continuum of lived realities as we express, become conscious of, name and take on (or are given) degrees of feminine or masculine to ourselves, to others, and to the things around us in the world.

Why gender is (or should be) included as a part of ecohealth research:

- Looking at the ubiquitous factor of gender helps us to see deep patterns - how relations shape lives at all scales and across all kingdoms, and between them.
- The subtle and on-going variations of gender help us to see and appreciate the grey-areas.
- Asking the “gender question” can lead to better science, more interesting and meaningful results, and better health outcomes. Ecosystem Approaches to Health “address how human health and environmental quality are determined by complex relationships” (www.idrc.ca/ecohealth). Gender is a factor and part of any relationship and thus many health impacts can be carefully traced to gender.
- The commitment to **equity, fairness, inclusivity and justice** that are guiding principles in ecohealth can be operationalized by bringing explicit attention to gender.

Working with Gender in your Ecohealth Course and Ecohealth Training:

Addressing and working with gender in the learning environment *can* be part of effective training for working across difference in the field. Many students and researchers will be working in cultural contexts that are very different from the ones where they grew up or studied; different food, different religious beliefs, different etiquette, different social orders. This can be very challenging. The quality of one's fieldwork experience can be made or broken by the ability to work with and through these differences. Explicitly foregrounding the factor of gender in our training programs - a kind of difference that will *always* be present - is one way test our assumptions and work at being able to think through, and become capable of cognitively and emotionally handling, deep differences.

BUT WAIT!! *GENDER ↔ SEX ↔ GENDER ↔ SEX ↔ GENDER ↔ SEX...*

These two categories are not nearly as distinct as we think. We are just starting to see that sex and gender are entwined, and work together in fascinating ways! Up to now it has been understood that biological realities (such as having breasts and being able to lactate) play a role in gender (social realities such as being able to dream about being a "mommy"). But the interactions go the other way too. Recent studies in an array of fields, including embryology, nutrition, genetics, biochemistry, and cognitive science find that "external factors" such as gendered behavioral norms, taboos, work habits, cues, experiences and expectations, can and do impact how biology *happens*. This is true from the patterns of chemical pathways in cells, development of cell lines, DNA and RNA expression, gamete strength to fertilize (Ainsworth, 2002), organ development, whole systems, hormonal profiles in utero and hence the 'sex' of the offspring, disease manifestations, aging patterns, morbidity and mortality. It is likely that this happens across kingdoms too, but at present, the science of tracking and cross-referencing all these different factors and influences, even within the human realm, is exceedingly challenging.

Example

Here is an example to get you thinking about the reciprocal, on-going, complex interactions of sex and gender:

Taboos and cultural values surrounding menstruation operate at many levels:

- Underfunding of "menses" research
- Overprescription of birthcontrol drugs to manage hormone fluxes, even in women past a reproductive age, and in nuns (Hirschler, 2012)
- Expectations that females who are menstruating should conceal it, for instance, by using tampons (Houppert, 1999).

These gender factors can have profound effects on girl's and women's mental and physical health.

- What chemicals bleach the cotton that tampons are made out of?
- What heavy metals are in the cotton?
- What plasticization is in the tampon applicators?
- What synthetic chemicals are in hormone pills that remain active in urine?

Think further: What about menses-related cultural practices that enter the ocean currents and hydrological cycles? What are the health impacts of these behaviours and products (estrogen, dioxin, plastics, pills, bleach) on creatures and ecologies who live 'downstream'? On fish, for instance? It is not unreasonable to imagine a causal connection between these factors and the documented phenomena of increased gonadal switching in fish populations (Kobayashi et al., 2009) and the collapse of fish populations (Kidd et al., 2007). These fish, in turn, are consumed as food, or fed to our gardens and plants (fertilizer) or pets (protein in dog and cat food). They end up in the air, in wells, in the stomachs and flippers of dolphins and whales, in our (and animals') drinking water, and in the water we use to irrigate our crops and wash our food and dishes with.

Now take the next step, and think these latter phenomena through to the medically confirmed facts of earlier and earlier onset of menses in human females, the 'feminization of boys' in utero, the decrease in fertilization power of sperm (Ainsworth, 2002), the anthropologically-confirmed fact of an increasingly sexualized culture (younger and younger women are expected to be sexy; older and older women are expected to maintain their sexiness) and off-kilter sex-ratios in many areas of the world. We aren't just talking about girls and women. The effects of gendered behaviour dovetails back into further taboos, illustrating feedback loops and a complex entwinement of what we tend to think of as 'cultural' and 'biological' axes.

The schema below begins to map social and biological factors together as reciprocal and indissociable, **but notice that we haven't included the wider ecological relations** within which these links take place. Ecological relations are impacted by social and biological factors, and also impact them.

These insights call for a **special term**: "GENDER↔SEX"



Now we are in a good position to answer our very first question:

Q: Why is gender↔sex an important component of ecohealth research?

Health. These reciprocal, complex and on-going interactions have profound consequences for the health and well-being of humans, animals, and the environmental sphere. Scholars and practitioners genuinely concerned with the health of all beings, at all levels, can better achieve those goals if they explicitly integrate **gender↔sex** into their worldview and research methods, whether they be hydrologists, nutritionists, molecular chemists, NGO workers, oncologists or psychologists.

Justice.

“There remain significant disparities in healthcare access and health outcomes for men and women. Every cell in our bodies is “sexed” and we must improve our understanding of how sex-based biological factors influence the way we respond to medication and other treatments. Every health interaction and behaviour is influenced by gender, and we need to understand the unique healthcare needs of men and women, girls and boys....Men continue to die at a younger age...while women experience a heavier burden of chronic illness.... There is emerging evidence that there may be many important ways in which sex and gender influence health that, if better understood, could inform interventions and programs designed to improve the health and well being of all people.” (Institute for Gender and Health, <http://www.cihr.ca/e/8677.html>).

Attention to gender↔sex in ecohealth research can better inform interventions and programs wishing to improve the health and well-being of all living beings; fish, rivers, trees, and even of our home planet thought by Latin American peoples (and many other groups around the world) as Mother, as female, as Pachamama.

Complexity & Humility. The multi-scalar, multi-factoral complexity of gender↔sex embedded within dynamic, lived, ecological and cultural realities, is a perfect touchstone for reminding us just how messy things really are. This reminder of the limits of any one line of questioning or situated position in the world pushes us to find out how things work. [Connects with 'Experiencing Health' in **Health Module** and 'Critical Perspectives' (on gender- and race-based assumptions) in the **Participation Module**].

ACTIVITIES

Activity 1: Brainstorming to stimulate thinking about "GENDER↔SEX"

Imagine that you are a graduate student and want to study heavy metals and human health.

STEP 1: Read all or some of the following questions out loud to the group or to yourself. You could also photocopy this page, and have students work through these on paper. After each question is a list of very basic reasonable choices you might make. (Read these out loud as well).

Note: *You can add anything to this question and answer list, you don't have to be an expert in the field. This is just an exercise to see how and where we omit, or could include, gender↔sex when thinking about our ecohealth research.*

Here are a few very basic questions you would have to ask yourself to frame your research project:

- **Which heavy metals are you going to test for?**
 - Cadmium? Selenium? Mercury? Lead? Arsenic? Nickel? Manganese?
- **What do you want to find out?**
 - How these negatively impact human health.
- **Where do you want to study? Which humans?**
 - India? Sweden? Brazil? Canada
- **What health issues are you concerned with, or funded to investigate?**
 - Cancer? Lesions?
- **What are you going to study? Test? Measure?**
 - Exposure levels
 - Transport mechanism in the cells and body system
 - Biochemical pathways (up- and down- regulation; methylation, metabolic pathways)

- **How are you going to study these things?**
 - Human hair samples
 - Water samples (Drinking? Washing? Irrigation?)
 - Blood samples
 - Mice and rats (Whole organisms? Behavioural? Cell lines?)
- **What do you hope to accomplish or contribute to?**
 - Better risk assessment
 - Mitigation strategies and health policy
 - Basic knowledge
- **How are you funded?**
- **Where will you study?**
 - With whom?
- **How will you disseminate your research results?**
- **How long do you think it will take you to do this work?**

STEP 2: Go back through each of these steps and for each one, brainstorm alone or in small groups how gender and sex might be relevant: shaping or impacting the options or possible outcomes.

STEP 3: Plenary Discussion
What did you come up with?

STEP 4: Now, you can really make it interesting by bringing into the hypothetical conversation some actual lab-based and field-based research findings. Cut the following claims into strips. Put them in a bag, pass it around and have people draw out and read one of the 'findings'. Give the group a chance to respond, before moving on to the next person and the next finding. You can stop whenever you want or need to.

Note: *If you don't want to cut into strips, the leader of session could choose several, read them out, and then ask the group to consider how their research project might change, in light of these findings.*

Actual lab-based and field-based research findings:

- Early studies (occupational health) mostly looked at men. Risk assessment was based on male work places and behavioral patterns, such as miners.
- Experimental (lab) animals are still almost all male.
- Gender differences in environmental health (stratifying analysis for sex) was seldom evaluated before 2005.

- The sex of the source of cells studied in laboratories was not recorded or reported, and is still rarely so.
- A development project in Bangladesh drilled wells and did not check for levels of arsenic. Half the wells are contaminated. If they are drilled deeper this will increase manganese levels in the water.
- Boys are more susceptible to lead than girls, but this depends on the 'environment': "One gender may be more sensitive than another under different environmental circumstances." (Bellinger, 2000)
- An additional source of lead is the tin pots water is carried in from wells, and food is cooked in. (Both done by women)
- Arsenic is linked to skin lesions. Men are more adversely affected physiologically. But women's cultural capital plummets if they have lesions, especially on their faces, because of gendered beauty norms. Some are kicked out of homes.
- There is a prevalence of nickel allergy among women in Bangladesh. The source turns out to be earrings and other adornments which are linked to cultural expectations for femininity. But only among poorer women: wealthier women can afford jewelry containing less toxic metals.
- The water from contaminated wells is used for watering rice paddies and animals.
- Zinc from mining waste is released into rivers, and used to flood paddies and fields.
- Polished rice (some GMO strains) has little cadmium but equally little nutritional value.
- There are the highest levels of cadmium in the healthiest foods: root vegetables, whole wheat, unpolished rice.
- There are unexpected links between arsenic and cancer: oral exposure of arsenic (water, food) leads to lung cancer. There are also links to bladder and liver cancer.
- WHO reports smoking is a known risk for bladder cancer. This has to do with levels of cadmium in the inhalation, the cadmium being in the tobacco plants.
- Women of the 3rd world are currently the fastest-growing group of 'smokers.'
- 'Elderly women's diseases' (hip fractures, kidney damage, bone loss') attributed to too many pregnancies. Risk of fractures doubles in relation to cadmium levels: studies are starting to look at heavy metals correlated with second-hand smoke, diet, exposure to radiation (even preventative, such as mammograms)
- The biomechanisms of cadmium and arsenic metabolism are still being worked out. It looks like there may be entirely different methylation pathways in men and women.
- Women's bodies but not men's can produce choline, (also sourced in eggs), and this methalates arsenic into homocysteryl ('MMA'). The methalated form is more toxic than the organic form. Methylation (upregulation) stops after menopause.

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- Women have double the concentrations of cadmium in their blood. This could be linked to iron transport mechanisms: the body is trying to compensate for iron loss during menstruation, taking up iron through intestinal transporters. Possibly aiming for iron but having an affinity for cadmium.
- MMA implicated in placental environment in fetal development.
- Pathways involve MMA in epigenetic events: after fertilization see a demethylation of DNA; then in implantation, a remethylation, before human blastocyst cells differentiate into lung cells, epithelial cells, and gonadal tissue.
- Exposure can and does involve itself in the endocrine pathways of the developing fetus, i.e. masculine and feminine traits, possibly sex ratios.
- Conventional wisdom is that Cadmium (2+) is trapped by the placenta and does not cross placental barrier, nor 'pass over, into breast milk, but the placenta also traps zinc, and this prevents nutrient uptake in fetus.
- Cadmium is linked to estrogenic effects on endometrium, and birthweight.
- Comparison of boys and girls at birth measure: weight, length, head circumference, and chest circumference.
- Lots of research is concerned with cancer, but very little looks at reproductive health and child development (mental and physical).
- There is a decrease in IQ with early and prenatal exposure to heavy metals (arsenic especially). Main IQ effect is on girls. (Linkage studies of average concentration in urine and IQ effects). This is especially marked around age 5, when schooling starts. Not so important for individual girls, but devastating at the population level; affecting "women's overall status".
- Need to take the maternal-fetal and then maternal-child as a single unit. Test for exposure with a variety of tests: longitudinal sampling (women, then pregnancy, then at birth, up to 10 years of age): urine (from pregnancy test), all through pregnancy (blood, hair, urine), breast milk, then birth outcome physiological and psychomotor testing, nutritional tracking.

This exercise was inspired by the incredible work of Dr. Marie Vahter, Institute of Environmental Medicine, at the Karolinska Institute, Stockholm, Sweden.

Activity 2: Passport

One effective way that the Copeh-Canada Teaching Team inserted gender↔sex prompts into our course was through a tool we designed and called “The Official Ecosystem Approaches to Health Passport.” This passport was carried by the students and faculty and contained pages earmarked for the topics in the course. Students used the pages for reflexive exercises and to jot down pertinent notes and questions on the topics.

Here is what the relevant pages looked like:

<p>QUE FAIRE AVEC CE PASSEPORT? Voici votre passeport officiel pour l'aventure. Gardez-le toujours sur vous. Après chaque session ou activité nous vous invitons à prendre quelques instants pour réfléchir à la pertinence d'intégrer ce que vous avez appris à votre travail ou projet et à noter ces réflexions (mots, musique, dessins, etc.). Nous vous invitons à utiliser les pauses, dîners, et activités sociales pour parler avec au moins cinq personnes du cours au sujet de votre travail. Quelle perspective unique ces personnes apportent-elles? Utilisez-les dernières pages pour conserver des informations importantes (courriel, références, site Web, etc.).</p>	<p>HOW DO I USE THIS PASSPORT? This is your official passport to adventure. Carry it at all times. After each class or activity take a moment to reflect on how what you learned could be integrated into your work or your project and write it down (words, music, drawings, etc.). Throughout the course use the breaks, lunches and social events to speak with at least five participants about your work. What unique perspective do they bring to your subject area? Use the pages at the end of the passport to keep track of important information (emails, references, web sites, etc.).</p>	 <p>Genre / Gender</p>
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SESSION OUTLINE: SEX<->GENDER AND HEALTH

DESCRIPTION

More and more studies have found that so-called “external factors” such as gender - social /cultural/contextual variance in realities, expectations and experiences – can and do play a feedback role in biology. What are called ‘environmental exposure pathways’ can modify and modulate the range and expressions of gender and sex in ways we are only just beginning to imagine. Many environmental health researchers and health professionals are committed to taking sex and gender considerations seriously in their fundamental (basic) research; however it is much easier to incorporate sex in science studies than to incorporate gender.

It is commonly recognized that boys and girls and men and women are biologically different. That their experiences bring them into contact differently with their physical and social environments during their lifespans. Yet, environmental and health research are still struggling to translate this truth into methodologically-sound approaches or studies that adequately consider sex *and* gender. This sub-section presents the challenges of integrating sex and gender into environmental health research and examples of some approaches approaches that address these challenges.

LEARNING OBJECTIVES

- Understand why and how to integrate integrate the concepts of sex and gender in fundamental research in environmental health.
- Propose approaches to addressing gender and sex as independent and dependent determinants in a range of health research approaches.
- Recognize that gender is relevant to our work even if we are not “studying gender”.

KEY QUESTIONS

Here are some key questions which underlie gender↔sex in basic health research:

- How do sex and gender manifest themselves biologically in relation to human health?
- Are the differences between males and females more plastic and fluid at the sociocultural level than at the cellular level? Is this an assumption on our part or is it well-grounded?
- How can we put sex and gender together in fundamental biological studies? Is this possible? What good models or working examples could we study that have managed this?
- Why is it so hard to incorporate gender and sex in experimental environmental health research? (The fundamental problem we face is that in the basic sciences,

MODULE 5: GENDER

the scientific method is deliberately built to “remove” context. How do we put gender in when gender is inherently about context?)

- What are the difficulties in incorporating gender into experimental environmental health research? Can you define/articulate it?
- Do animals, plants, and cells have gender in addition to sex characteristics? How can we account for these in basic research?
- If gender becomes infeasible to examine in research approaches and the questions don't get addressed because we don't have tools or methods to address them: what do we do given that we are in fact, committed to equality, equity, justice, etc?

KEY IDEAS

- Biology (sex) and social conditions (gender) are in dynamic interaction and vary throughout life. Environmental factors can affect one or the other (or both differently), with important consequences on health and wellbeing.
- No single factor or axis (social or biological) can be considered to cause diseases. Rather, it's the interaction of many risk factors; genetic predisposition, biochemical, physiological, psychological, social, and cultural.
- Sex hormone levels vary widely across the lifespan for both men and women; estrogen, progesterone, and testosterone levels increase dramatically at puberty, and drop again post-menopause in women, and also in older men.
- Gender is not experienced or performed in the same way by all individuals, and designing studies to account for this variance is undoubtedly a complicated matter.
- Sex and gender can also confound one another, making the analysis even more difficult.

SPECIALIST PRESENTATION

A formal presentation on the integration of sex and gender in health research should be included, whenever possible. It could be someone from your teaching team, if you have expertise, or you could invite a guest. It can be from any scientific discipline so long as the focus is on the integration of sex and gender in research in environment and health.

A topic example: Epigenetics and fetal programming involves environment as well as sex and gender impacts.

ACTIVITIES

Activity 1: Create a 'gender lens' tool for basic research

Plenary Discussion: What questions and frames of reference do we need in order to bring a “gender lens” to our research?

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Here are some initial questions to be discussed, developed, added to and arranged by the group.

- Make a list of all of the gender↔sex issues you can think of that are relevant to your research question.
- Situate yourself.
- What kinds of assumptions about gender↔sex are you making?
- What system are you using?
- Identify how any of these things can feasibly be addressed in a meaningful way within the constraints of your experimental models and approaches
- What could be gained by making things more complex? What could be lost by making things more complex?

Activity 2: Link to posters

STEP 1: Students can work together or in groups with a leader to concretely apply the question of how to integrate gender↔sex in their projects (research question, hypothesis/objectives and data analysis).

STEP 2: Return to their research hypotheses and, with the freest possible imagination, imagine the causal linkages, loops and interrelations going on among gender and sex.

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