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You Say “Natural Resources,” We Say Part of Our Community Health: Using Indigenous Health Indicators to Evaluate Coast Salish Priorities when the Environment Is Polluted

Rory O’Rourke,* Larry Dunn, Denise Taylor, Alison O’Sullivan, and Jamie Donatuto

ABSTRACT

Background: There has long been a call for metrics that effectively evaluate Indigenous community health based on an Indigenous community’s worldviews and priorities. Indigenous definitions of health are often not considered in decision-making, which contributes to environmental pollution disproportionately impacting American Indian and Alaska Native communities. The Indigenous Health Indicators (IHIs) were established by the Swinomish Indian Tribal Community specific to their knowledge of health and well-being, to better reflect the integral connections to coexistence with other humans, nature, and all animate beings. The IHIs combine elements of quantification and replicability while incorporating Indigenous priorities. This collaboration sought to evaluate an amended set of IHIs for a broader Coast Salish representation of Indigenous health values and priorities using four workshops, involving Tribal members from each participating Tribe: Lower Elwha Klallam Tribe, Port Gamble S’Klallam Tribe, Suquamish Indian Tribe of the Port Madison Reservation, and Stillaguamish Tribe.

Methods: Workshop participants were asked to rank indicators during two hypothetical pollution scenarios that impacted traditional foods. Effectiveness was measured using statistical analyses and qualitatively by transcribing discussion.

Results: The four workshops demonstrate that the IHIs are useful in communicating what participants feel are important regarding Indigenous and Coast Salish values of community health and well-being.

Discussion and Conclusion: Workshop participants and Tribal leaders indicated an interest in exploring this tool for different contexts. Additional research is needed to evaluate whether these indicators would be useful in diverse geographic regions.

Keywords: Indigenous, health, indicators, community, environment, values

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INTRODUCTION

Imagine that an oil spill occurs on an abundant shellfish beach near your home. You have gathered here with your relations for countless generations since time immemorial. You received place-based teachings at this beach, and you are passing these on to your children, your community hosts ceremonies here. The company responsible for the spill declared bankruptcy and does not have any money to address the contamination. You are worried about the pollution. Will your children and grandchildren ever be able to safely visit or harvest from the beach again? If so, how long will it take for the damage to be repaired? Will there ever be enough clams and oysters to support cultural practice? Will the salmon return to the nearby estuary, or will they turn away because they no longer recognize the smell of their natal stream? With limited time and money, how does your community prioritize what is most important?

There has long been a call for metrics that effectively evaluate Indigenous community health based on an Indigenous community's worldviews and priorities.^{1,2} American Indian and Alaska Native communities experience disproportionate impacts from environmental hazards and pollution.^{3,4} Yet environmental health assessments by government agencies, industry, and researchers from outside the Indigenous communities fail to include Indigenous definitions of health and omit methodological guidance on how to evaluate Indigenous health.^{5,6} The lack of a replicable methodology has compromised the quality and consistency of results, and outcomes for Indigenous peoples.⁷

In 2008, the Swinomish Indian Tribal Community (Swinomish) began sharing their work in developing a set of Indigenous Health Indicators (IHIs), specific to their knowledge of health and wellbeing, to better reflect the integral connections to coexistence with other humans, nature, and all animate beings.⁸ From 2009 to 2013, Tribal representatives from other Coast Salish Tribes and First Nations in the Cascadia region collaborated with the Swinomish experts to expand the initial set of the IHIs to a broader Coast Salish representation of Indigenous health values and priorities (Fig. 1).^{9,10,11} We were investigating whether the communities' perceptions of health are more accurately evaluated when the indicators reflect Indigenous definitions of health while also respecting each community's worldviews and sovereignty. The research objectives were to establish IHIs that reflect each Coast Salish community's meanings and priorities, assess the usability of the IHIs using hypothetical scenarios with workshop participants, and evaluate the IHIs' efficacy by reviewing the results with participants and Tribal leaders. In this paper, we describe how we tailored the IHIs and then tested their validity in partnership with the Port Gamble S'Klallam (PGST), Suquamish Indian Tribe of the Port Madison Reservation (Suquamish/Suquamish Tribe), Lower Elwha Klallam (LEKT), and Stillaguamish Tribes (Stillaguamish).

METHODS

Swinomish developed the IHIs through a triangulation method to gather community health concerns and priorities: a review of archive materials, current Tribal documents, and interviews with Tribal members. The creation, development, and implementation of the IHIs at Swinomish have been previously discussed in detail elsewhere.^{12,13,14} Staff from each of the Tribes employed the same triangulation method Swinomish used to compare

¹c.f. Jeanette Wolfley, "Ecological Risk Assessment and Management: Their Failure to Value Indigenous Traditional Ecological Knowledge and Protect Tribal Homelands," *American Indian Culture and Research Journal* 22 (March 1, 1998), <<https://escholarship.org/uc/item/2dk836xv>>.

²Mary Arquette, Maxine Cole, Katsi Cook, Brenda LaFrance, Margaret Peters, James Ransom, Elvera Sargent, Vivian Smoke, and Arlene Stairs, "Holistic Risk-Based Environmental Decision Making: A Native Perspective," *Environmental Health Perspectives* 110 (April 2002): 259–64, <<https://doi.org/10.1289/ehp.02110s2259>>.

³Cynthia Agumanu McOliver, Camper AK, Doyle JT, Eggers MJ, Ford TE, Lila MA, Berner J, Campbell L, Donatuto J, "Community-Based Research as a Mechanism to Reduce Environmental Health Disparities in American Indian and Alaska Native Communities," *International Journal of Environmental Research and Public Health* 12 (April 2015): 4076–4100, <<https://doi.org/10.3390/ijerph120404076>>.

⁴Eric Jonathan Lacey, "Manifest Destiny's New Face: Soft-Selling Tribal Heritage Lands for Toxic Waste," *Georgetown Law Journal* 92 (2004): 405–433.

⁵Jamie L. Donatuto, Terre A. Satterfield, and Robin Gregory, "Poisoning the Body to Nourish the Soul: Prioritising Health Risks and Impacts in a Native American Community," *Health, Risk & Society* 13 (April 2011): 103–27, <<https://doi.org/10.1080/13698575.2011.556186>>.

⁶Jamie Donatuto, Larry Campbell, and Robin Gregory, "Developing Responsive Indicators of Indigenous Community Health," *International Journal of Environmental Research and Public Health* 13 (September 9, 2016): 899, <<https://doi.org/10.3390/ijerph13090899>>.

⁷Nancy Turner *et al.*, "From Invisibility to Transparency: Identifying the Implications," *Ecology and Society* 13 (August 1, 2008), <<https://doi.org/10.5751/ES-02405-130207>>.

⁸Donatuto, Satterfield, and Gregory, "Poisoning the Body to Nourish the Soul."

⁹Donatuto, Campbell, and Gregory, "Developing Responsive Indicators of Indigenous Community Health".

¹⁰Melissa R. Poe, Jamie Donatuto, and Terre Satterfield, "'Sense of Place': Human Wellbeing Considerations for Ecological Restoration in Puget Sound," *Coastal Management* 44 (September 2, 2016): 409–26, <<https://doi.org/10.1080/08920753.2016.1208037>>.

¹¹Robin Gregory *et al.*, "Values-Based Measures of Impacts to Indigenous Health," *Risk Analysis* 36 (2016): 1581–88, <<https://doi.org/10.1111/risa.12533>>.

¹²Donatuto, Satterfield, and Gregory, "Poisoning the Body to Nourish the Soul"; Donatuto, Campbell, and Gregory, "Developing Responsive Indicators of Indigenous Community Health".

¹³Jamie Donatuto *et al.*, "Indigenous Community Health and Climate Change: Integrating Biophysical and Social Science Indicators," *Coastal Management* 42 (July 4, 2014): 355–73, <<https://doi.org/10.1080/08920753.2014.923140>>.

¹⁴Jamie Donatuto, Larry Campbell, and William Trousdale, "The 'Value' of Values-Driven Data in Identifying Indigenous Health and Climate Change Priorities," *Climatic Change* 158 (January 1, 2020): 161–80, <<https://doi.org/10.1007/s10584-019-02596-2>>.

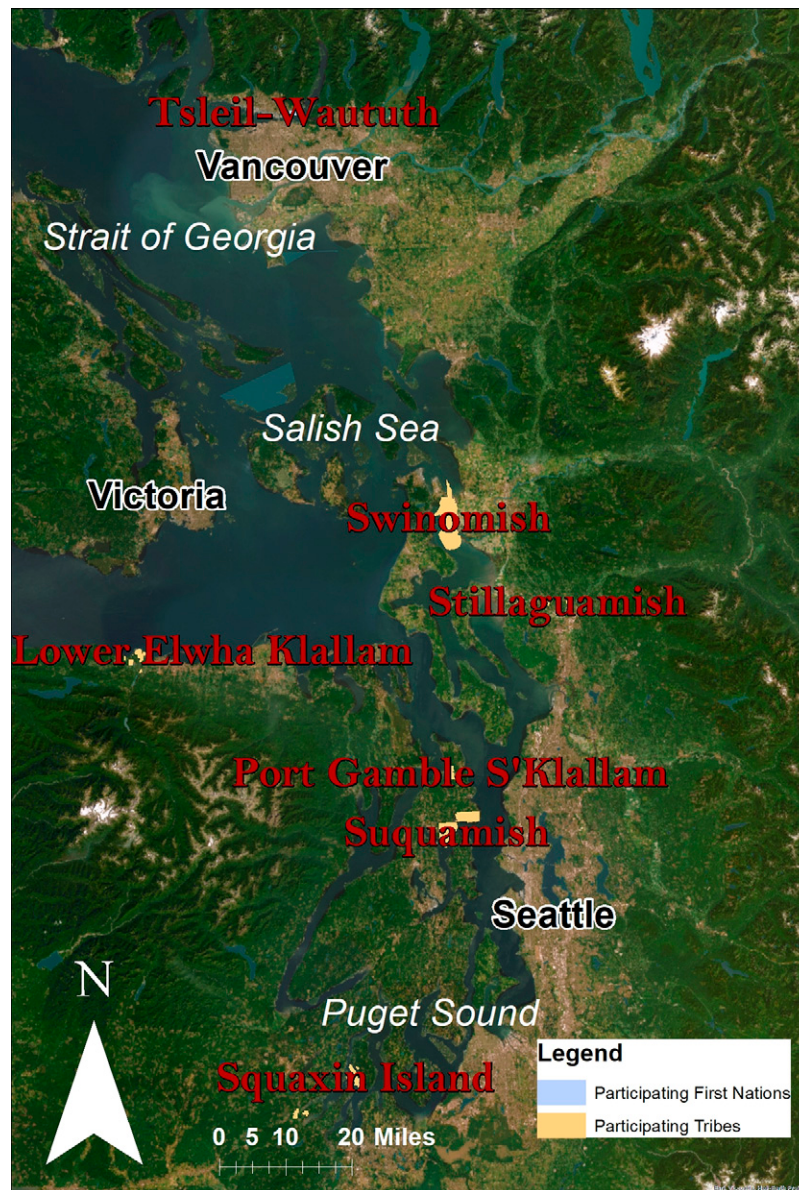


FIG. 1. Coast Salish Tribes and First Nations that have tested the Indigenous Health Indicators (IHIs).

how each community defined and prioritized health and well-being to the initial set of Swinomish IHIs, looking for similarities and differences in word use, meaning, and emphasis. We did not want to assume that a regional set of IHIs was guaranteed, considering that even geographically close communities differ in their Indigenous knowledge, language, and values. While the Swinomish IHIs reasonably reflected community health and well-being goals in the other communities, and priorities stated in archives and recounted via interviews with current experts and Elders, there were some missing elements. The regional Coast Salish group amended some of the indicator names to more regionally acceptable names and added two indicators for a total of six IHIs: community connection, (natural) resources security, cultural use, education, self-determination, and resilience (Table 1).

Each indicator is composed of three parts called “attributes”. The attributes are the true “meat” of the indicators since the attribute connects terms used by community members and found in Tribal documents. For example, the attributes for the “resources security” indicator are the quality of the resource; access to the resource by harvesters; and the extent to which harvesting, consuming, and/or using the resource is perceived as “safe” by the community (e.g., absence of pollution). All three attributes are priorities to community members past and present and Tribal governments alike. The indicator names (such as “resources security”) are not commonly used language in any of the communities but instead created to group the attributes and provide terminology that those outside of the Indigenous communities can understand (in other words, “translations” for non-Indigenous peoples).

TABLE 1. INDIGENOUS HEALTH INDICATORS

<i>Community connection</i>	
Cooperation/Relations ^a	Community members have a job or role that they and other community members respect and they work together (mutual appreciation, respect, cooperation)
Participation (roles)/Work ^a	Community members engage in active sharing networks, which are integral to a healthy community, ensuring that everyone in the community receives traditional foods and other natural resources such as plant medicines, especially Elders
Familiarity/Trust ^a	Community members support, trust, and depend on each other
Resources Security/Natural Resources Security	
Abundance	The natural resources, including the elements (e.g., water), are abundant and healthy
Access	All resource use areas (i.e., usual and accustomed areas in WA) are open to harvest/use (not closed or privatized) by community members
Sharing	The natural resources, including the elements (e.g., water), are abundant and healthy, and there is enough to share with others in the community, especially Elders
Ceremonial/Cultural Use	
Gatherings and ceremonies	Community members are engaging in traditional resource-based activities, which is a continued reminder/connection to ancestors and homeland
Respect	Community members are conferring respect for/to the natural resources and connections between humans, the environment, and the spirit world; ensuring cultural resources are properly maintained
Spiritual/cultural needs	Community assemblies able to follow appropriate customs (e.g., can obtain specific natural resources if needed such as cedar, certain foods, etc.), and are able to honor proper rituals, prayers and thoughtful intentions
Education	
Elders	The knowledge keepers are valued and respected, and able to pass on the knowledge
Youth	The community's future is able to receive, respect, and practice their culture
Cultural traditions	The community maintains the knowledge, values, and beliefs important to them
Self-determination	
Healing	The availability of and access to healing opportunities (e.g., traditional medicines, language programs) for community members
Economic development	The ability for a community to determine and enact their own, chosen community enrichment activities in their homelands without detriment from externally imposed loss of resources
Restoration	The community's freedom to define and enact their own, chosen environmental, health, and habitat restoration programs
Well-being	
Connection to environment	The beliefs and evaluations community members hold about themselves are positive, providing an internal guiding mechanism to steer and nurture people through challenges, and improving control over outcomes
Confidence	Community members can strongly connect with who they are as a community (Tribe or Nation) in positive ways
Resilience	The community is to adapt (e.g., people hunt with guns and use motorboats today but that doesn't discount the significance of harvesting) and move within homelands voluntarily in response to changes (the "7 generations thinking")

^aStillaguamish decided to use the words after the forward slash to describe these concepts more familiar in their culture.

TABLE 2. INDIGENOUS HEALTH INDICATORS WORKSHOP FACILITATOR QUESTIONS

-
- | | |
|---|---|
| <p>1) Are you... (multiple choice)</p> <ol style="list-style-type: none"> 1. Male 2. Female | <p>2) How old are you? (multiple choice)</p> <ol style="list-style-type: none"> 1. Under 20 2. 21–30 3. 31–40 4. 41–50 5. 51–60 6. 61–70 7. 71–80 8. Over 80 |
| <p>3) Where do you live? (multiple choice)</p> <ol style="list-style-type: none"> 1. On Reservation 2. Off Reservation | <p>4) On a scale of 1–4, in general how are things now in terms of the overall health of the community? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great |
| <p>5) Abundance: On a scale of 1–4, is enough seafood available in the Tribe's usual and accustomed (U and A) areas? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great | <p>6) Access: On a scale of 1–4, are there enough sites for use in the U and A areas? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great |
| <p>7) Sharing: On a scale of 1–4, does everyone in the community have access to seafood if they want it? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great | <p>8) Cooperation: On a scale of 1–4, how well does the community work together and communicate?
Stillaguamish only: On a scale of 1–4, are community members actively involved in community gatherings? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great |
| <p>9) Participation (roles): On a scale of 1–4, are community members actively involved in community gatherings?
Stillaguamish only: Work: On a scale of 1–4, how well does the community work together and communicate? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great | <p>10) Familiarity/Trust: On a scale of 1–4, how familiar are you with the fishers who are providing the community's seafood? (multiple choice)</p> <ol style="list-style-type: none"> 1. Not at all 2. Not very well 3. Pretty well 4. Great |
| <p>11) Gatherings and ceremonies: On a scale of 1–4, are gatherings able to get as many local traditional natural resources (food, plants, etc) as needed? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great | <p>12) Respect: On a scale of 1–4, are local natural resources collected in the proper way, according to our traditions? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great |
| <p>13) Spiritual/cultural needs: On a scale of 1–4, is everyone in the community able to satisfy their spiritual/cultural needs with the resources currently available? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great | <p>14) Healing: On a scale of 1–4, are there tribal programs available for tribal members to reconnect with culture and natural resources? (multiple choice)</p> <ol style="list-style-type: none"> 1. Things are very bad 2. Not very good 3. Looking pretty good 4. We're doing great |

(continued)

TABLE 2. (CONTINUED)

15) Economic development: On a scale of 1–4, are there tribally owned development projects that benefit the community? (multiple choice)	16) Restoration: On a scale of 1–4, are there tribal projects that protect or restore habitat and resources that benefit the community? (multiple choice)
1. Things are very bad	1. Things are very bad
2. Not very good	2. Not very good
3. Looking pretty good	3. Looking pretty good
4. We're doing great	4. We're doing great
17) Elders: On a scale of 1–4, are Elders able to pass on our knowledge, beliefs, and values to younger tribal members? (multiple choice)	18) Youth: On a scale of 1–4, are youth actively learning our knowledge, beliefs, values, and traditions? (multiple choice)
1. Things are very bad	1. Things are very bad
2. Not very good	2. Not very good
3. Looking pretty good	3. Looking pretty good
4. We're doing great	4. We're doing great
19) Cultural Traditions: On a scale of 1–4, are our knowledge, beliefs, values, and traditions still followed in the community? (multiple choice)	20) Connection to Environment: On a scale of 1–4, are you satisfied with the amount of time you are able to spend in the outdoors? (multiple choice)
1. Things are very bad	1. Things are very bad
2. Not very good	2. Not very good
3. Looking pretty good	3. Looking pretty good
4. We're doing great	4. We're doing great
21) Confidence: On a scale of 1–4, are you confident that local natural resources are safe to harvest and eat? (multiple choice)	22) Resilience: On a scale of 1–4, do you believe that important resources will be available for the next seven generations? (multiple choice)
1. Things are very bad	1. Things are very bad
2. Not very good	2. Not very good
3. Looking pretty good	3. Looking pretty good
4. We're doing great	4. We're doing great
23) Resources security: rank the three parts of this health indicator (choose them in order from most to least important) (priority ranking)	24) Community connection: rank the three parts of this health indicator (choose them in order from most to least important) (priority ranking)
25) Cultural or Ceremonial use: rank the three parts of this health indicator (choose them in order from most to least important) (priority ranking)	26) Self-determination: rank the three parts of this health indicator (choose them in order from most to least important) (priority ranking)
27) Education: rank the three parts of this health indicator (choose them in order from most to least important) (priority ranking)	28) Well-being: rank the three parts of this health indicator (choose them in order from most to least important) (priority ranking)
29) Scenario 1: Oil Spill Clean-up What are the most important Health Indicators? (press the number on your keypad in order: 1 = most important to 6 = least important) (priority ranking)	30) Scenario 2: River or Bay Pollution Clean-up What are the most important Health Indicators? (press the number on your keypad in order: 1 = most important to 6 = least important) (priority ranking)
31) On a scale of 1–4, in general how are things now in terms of the overall health of the community? (multiple choice)	
1. Things are very bad	
2. Not very good	
3. Looking pretty good	
4. We're doing great	

TABLE 3. SCENARIOS PRESENTED TO WORKSHOPS

<i>Scenario</i>	<i>Description</i>
Scenario 1: Oil spill cleanup	“A cleanup is underway at a beach located on the reservation. For many years, this beach has been a popular steamer clam digging area for tribal members, who also value it for ceremonial and spiritual purposes. A recent oil spill from a passing tanker has contaminated the beach, forcing tribal members to travel to a remote beach in order to dig. Despite media attention, no cleanup has occurred. The tanker owners—the business responsible—are bankrupt. State and Federal authorities have promised a full cleanup, but they lack funds and there is a backlog of other cleanup sites, making it unlikely that the spill will be cleaned up quickly or 100%. The State and Federal governments are now asking for help from Tribal members to provide guidance on where to focus the limited resources and funding. The Tribe has agreed to provide information about the effects of the beach spill on six community health indicators”
Scenario 2: River or Bay cleanup	“The Tribe’s main fishing river is being polluted by intensive farming practices, including agricultural run-off, livestock entering the river, and deforestation of the riverbanks. Some community members are worried that pollution in the river is negatively affecting the health of Elders and children in the community, and negatively impacting the numbers and health of juvenile salmon, affecting not only the food fishery but also the use of salmon for ceremonial purposes. The Tribe plans to exercise its legal rights by pushing for better protection of the river but changing regulations and behaviors to limit pollution and protect the river’s banks will take a long time. In the short term, local and State regulators insist that, although they support the Tribe’s concerns, they do not have enough money or staff to begin to clean up the river. The Tribe is frustrated and is seeking input from community members to prioritize restoration efforts with the goals of reducing health risks to the human community and maintaining and protecting salmon habitat” The scenarios offered some flexibility to provide context for each focus group. Scenario 2 was changed to a “Bay Pollution Cleanup” for the PGST focus group. PGST’s reservation is directly adjacent to Port Gamble Bay, which was undergoing planning for a contaminated sediment cleanup at the time of the focus group. It is also of significant cultural and spiritual importance to tribal members. There was not a river nearby that had the same significance: “Debris, run-off and air pollution leads to contamination of the water and sediments in bay. Wood waste, creosote pilings, and historic uses contribute to the contamination”

Once the staff amended the IHIs at these two levels—as indicators, and in terms of specific attributes—the next steps were to define each of the IHIs using constructed measures and scales and then to test the extent to which the measures were understandable to the community members and accurately conveyed their health concerns and priorities. To ground-truth the amended set of IHIs, staff from each participating Tribe organized a workshop for their community.¹⁵ Staff recruited workshop participants by inviting Tribal members considered knowledge holders, specifically those who had familiarity with natural resources issues and community involvement. The recruitment goal was 15 participants across diverse ages, viewpoints, and family groups, but not to achieve representation of overall Tribal demographics. The primary workshop goals were to evaluate if the indicators resonated with

participants and whether the ranking and weighting procedures were comprehensible and operational.

In September and November 2012 respectively, LEKT and PGST hosted their workshops. Suquamish Tribe hosted its workshop in March 2013 and Stillaguamish Tribe its workshop in November 2013. Workshop results were presented to the Tribal Council of each Tribe where the workshop occurred. Each Tribal Council was asked to approve sharing the workshop results in a published journal article.

Workshop discussions lasted about 3 hours, including a lunch of traditional foods. Each workshop hosted by each Tribe occurred at a communal space on the reservation. Swinomish experts J.D. and Swinomish Elder Wanaseah (Larry Campbell) facilitated each workshop along with at least one representative from the hosting Tribe. The Tribal representative was typically a political leader or an expert on cultural and natural resources. Each workshop participant received an honorarium for sharing their time and knowledge.

¹⁵This study was reviewed and approved by the Portland Area Indian Health Board’s Institutional Review Board.

Every workshop began with an opening prayer and visiting experts giving thanks for being welcomed onto the Tribe's lands. After introductions, we explained the purpose and how the handheld polling clickers would collect the participants' answers. We emphasized that all answers are anonymous and that no data would be publicly released without prior approval by the Tribal Council.

Questions were projected in PowerPoint®, with TurningPoint® polling software used to collect and display results. The polling software allows answers to be collected anonymously, tallied, and recorded immediately via wireless, hand-held devices. Using simple statistics, the polling responses were collated and visually depicted in the PowerPoint presentation (e.g., bar graph). Each workshop used the amended IHIs (Table 1), with specific substitutions included and described. Indicators were modified slightly by Tribal staff to provide context and familiarity to participants. We added an illustrative photograph specific to the Tribe next to the name of each of the six IHIs to contextualize the indicator's meaning and to visually aid in describing the indicator. The same statistical methods described in previous publications were employed in these workshops.¹⁶ To briefly summarize: Four different types of questions were asked of each participant (Table 2). The first set of questions established a primarily demographic community health baseline: age, gender, and residential status on the reservation.

The second set of questions, called "Where are we now?", established a baseline by scaling to rank each indicator individually using a four-point descriptive scale:

1. Things are very good
2. Not very good
3. Looking pretty good
4. We're doing great

Using a four-point scale compelled participants to think about their answers instead of picking a "middle road" option.¹⁷ The scales allow for concerns and priorities to be demonstrated without releasing proprietary knowledge that may be driving the chosen ranking.

The third set of questions asked participants to rank the three attributes of each indicator, choosing them in order from the most to least important, while understanding that all are important overall. For example, for "resources security," participants ranked in order of most important to least important the three attributes of "access," "quality," and "safety."

The fourth set of questions prompted participants to rank indicators from most to least important during two

scenarios, knowing that all are important but ranking them based on the Tribe's limited time and resources to address each attribute one at a time. The scenarios contextualize ranking and weighting the indicators. Facilitators presented the group with two hypothetical yet realistic scenarios of local pollution events (Table 3). Participants first used direct ranking and then criteria weighting which indicators would be most important to address first considering the contamination and potential threat to Tribal resources. Tribal staff slightly changed the scenarios to make them unique and relatable, for example, including place names specific to each Tribe.

After lunch, the facilitators shared the results with the workshop participants. Seeing the results on the screen sparked conversation and stories. One of the experts transcribed notes of the qualitative discussion dialogue for each workshop. The participants offered their interpretations of how the results reflected community health and well-being meanings and priorities in the community. The effectiveness of each indicator was gauged by its ability to stimulate discussion and how well the indicators resonated with participants.

RESULTS

Both the quantitative and qualitative results are detailed in the "Results" section. All participants who volunteered were enrolled in the workshops. 65% of the participants at the workshops were women. The age group with the most participants was 51–60 years of age having 15 participants across all four workshops (Fig. 2). The majority (over 60%) of respondents from Tribes surveyed in the workshops lived on the reservation.

Workshop participants from all four Tribes had different perceptions of the overall community health when asked "On a scale of 1–4, in general, how are things now in terms of the overall health of the community?"¹⁸ Suquamish participants responded the most to "Not very good" at 71%. For Stillaguamish participants, the largest response was "Not very good" at 50%. PGST participants were evenly split between "Looking pretty good" and "Not very good." LEKT participants responded the most to "Looking pretty good" at 65%.

Participants next ranked each indicator after being presented with Scenario 1 then Scenario 2. Resources Security was commonly weighted as the most important indicator in both scenarios (Tables 4 and 5). Three of the four workshops ranked "Resources Security" or "Natural Resources Security" as the most important indicator in Scenario 1. Workshops most frequently ranked "Resources Security" as the most important indicator for Scenario 2. When Resources Security was not weighted as the most important, it was weighted as the

¹⁶Donatuto, Campbell, and Gregory, "Developing Responsive Indicators of Indigenous Community Health"; Donatuto, Campbell, and Trousdale, "The 'Value' of Values-Driven Data in Identifying Indigenous Health and Climate Change Priorities."

¹⁷Elaine Allen and Christopher A Seaman, "Likert Scales and Data Analyses," n.d.; Donatuto, Campbell, and Gregory, "Developing Responsive Indicators of Indigenous Community Health."

¹⁸Suquamish and Stillaguamish workshop questions were modified to "On a scale of 1–4, Where do you think the community is right now ([Year of workshop]) in terms of its overall health?"

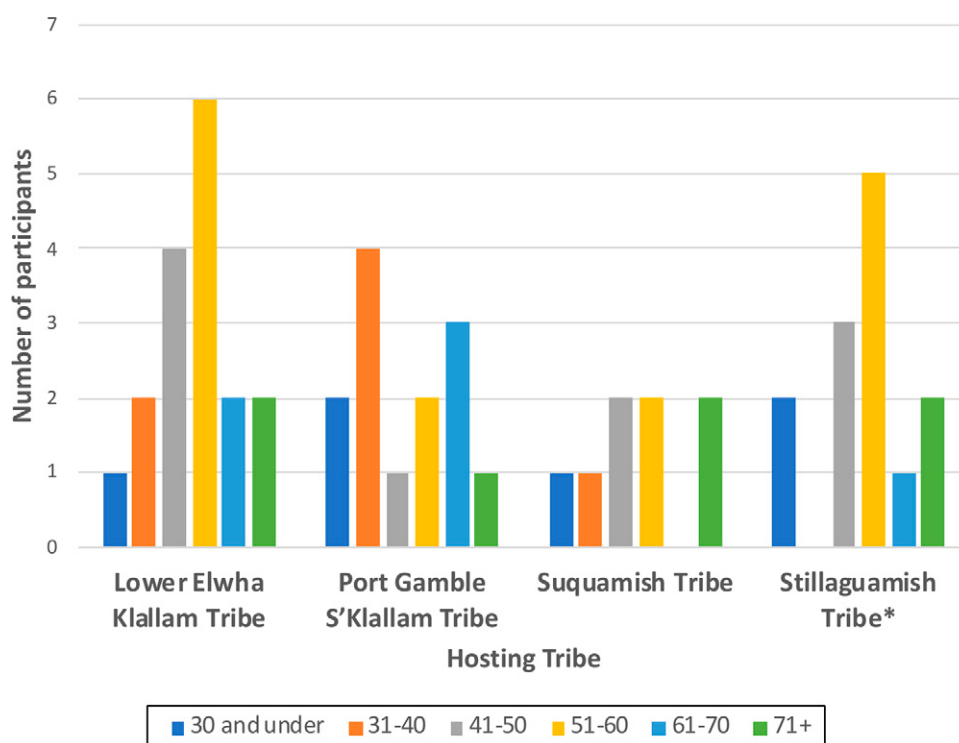


FIG. 2. Age demographics of workshops from participating tribes. *Two Stillaguamish Tribe workshop participants did not respond to the question about age.

second most important indicator. Cultural and ceremonial use was commonly prioritized by workshop participants across all four Tribes. Community connection was frequently weighted as the second most important indicator during the scenarios.

There was substantial variability between weighting the “Well-being” indicator. PGST and LEKT workshops weighted this indicator as least important in Scenario 2. The Suquamish workshop weighted “Well-being” as the most important for Scenario 2. The Stillaguamish workshop gave “Well-being” a middle priority.

No indicator was unanimously ranked as least important in either scenario.

Qualitative

The indicator ranking spurred discussion among workshop participants about natural resource issues. Participants across all workshops had concerns about resource availability for another seven generations impacting Tribal

members’ ability to pass down cultural heritage to future generations. Across all four workshops, participants voiced concerns about how to best allocate diminishing natural resources between Elders, youth, and families.

A common theme across all workshops was the importance of continuing intergenerational knowledge transfer between youth and Elders. All four workshops discussed passing down knowledge to youth and future generations through the Elders. While participants generally agreed with the importance of reclaiming and continuing cultural teachings, there was also a more nuanced discussion regarding the necessity of reciprocal relationships. The youth cannot learn if the Elders do not teach, and the Elders cannot teach if the youth do not want to learn. Each is necessary for the other and has limited effect without the other. All workshops shared some level of dissatisfaction with how well these reciprocal relationships functioned in their communities.

Community connection. Discussion around this indicator demonstrated differences among workshops. At

TABLE 4. HEALTH INDICATOR RANKING BY WORKSHOP FOR SCENARIO 1: OIL SPILL CLEANUP

Hosting tribe	The most important health indicator	Median weight by participants (%)	The second most important health indicator	Median weight by participants (%)
Lower Elwha Klallam Tribe	Resources Security	18.44	Community Connection	17.66
Port Gamble S'Klallam Tribe	Ceremonial Use	21.41	Resources Security	18.92
Suquamish Tribe	Resources Security	22.86	Community Connection/Cultural Use (tie)	17.14
Stillaguamish Tribe	Natural Resources Security	24.88	Cultural Use	21.66

TABLE 5. HEALTH INDICATOR RANKING BY WORKSHOP FOR SCENARIO 2: BAY/RIVER POLLUTION CLEANUP

<i>Hosting tribe</i>	<i>The most important health indicator</i>	<i>Median weight by participants (%)</i>	<i>The second most important health indicator</i>	<i>Median weight by participants (%)</i>
Lower Elwha Klallam Tribe	Resources Security	18.72	Community Connection	17.63
Port Gamble S'Klallam Tribe	Resources Security	19.89	Ceremonial Use	17.59
Suquamish Tribe	Well-being	20.10	Resources Security	19.35
Stillaguamish Tribe	Natural Resources Security	23.92	Cultural Use	16.27

LEKT, some participants felt that fishers were good about sharing their catch with the cooks for community events and celebrations such as Canoe Journey. At PGST, a participant expressed frustration with the level of sharing.

Suquamish workshop participants felt that participation (roles) was difficult to evaluate because of differing views on how to define community. One participant commented that it is always the same community members who show up even though notice goes out to all. Canoe Journey has enormous participation with a commitment over multiple days, which many workshop participants viewed as an example of Community Connection.

For the Suquamish workshop, coming to a common understanding of the word “community” seemed to be needed not only for the community connection indicator but for the overall discussion. Participants offered several different definitions of “community,” all of which had relevance in specific contexts. Does “community” include those who live far away and only collect per capita? Is it based on geographical location or a smaller percentage of people who are active as a community? If the perception and definition of community affect how other indicators and attributes are valued, it may be important to bring this forward in the process.

Suquamish participants indicated they have seafood at gatherings but lack plants, elk and deer meat, and other traditional gathering items. “Fishermen are independent here, they provide for family and events but that’s it.” There was discussion about using the workshop methodology to help identify ways to improve access to and sharing of traditional foods.

At Stillaguamish, a participant noted that fish consumption is low due to poor access to harvest areas. “Many tribes have 400–800 grams of fish per day. All we have is a small coho [salmon] run and shellfish beds which are not established. Our fish consumption rate is low because of poor access. Many in our Tribe are turning to hunting.” Another participant stated, “Tribes eat the highest rate of fish [in Washington State]. We want our food to be safe to eat and we take pride in our fish.”

Resources security. The indicators promoted discussion among PGST participants about who should participate in a limited harvest. Some felt that Tribal members with family to support should get priority, while others felt that the youth should get a chance. There was discussion on how the harvesters need to be more engaged in natural resources decision-making through more surveys and interviews on the issues of resource security. Some

participants expressed frustration with the process of negotiating with other Tribes for harvest quota. One participant voiced frustration about the pace of the Port Gamble Bay cleanup, and the ability to fish the bay and how that was impacting his income.

Some PGST respondents had difficulty weighing sharing against access and abundance. They felt sharing was not less important than access or abundance, but dependent on access and abundance. There were concerns about too many harvesters relative to the abundance of seafood. “It’s harder to make money on the beaches. Quotas are low on good beaches and high on beaches with almost nothing to harvest. Clams are too small and scarce; I have to dig a long time and have to travel farther and farther.”

Some LEKT tribal members felt that if they had more input, there would be enough resources.

Suquamish participants struggled with how to answer, “Where are we now?” Participants talked about the cultural and spiritual importance of water to the Tribal community and identity. The workshop participants then recommended that the term “resources” in resource security be expanded to include water. Suquamish participants remarked that water is a natural resource too, and that the health of water itself should be included in natural resources security.

Ceremonial use. Some LEKT participants felt that community participation in ceremonies was increasing. However, even if resources are available, there are issues with accessing fishing grounds and plant gathering areas for ceremonies. One reason is the difficulty of coordinating with non-tribal governments or private property owners.

“Some of us go to our areas and get cops called on me. Good thing I know our area, treaties, and laws. The person who thought they owned the whole ocean would chase away Indians from their own area.”

At PGST, respondents acknowledged having polluted foods at some gatherings and ceremonies.

Suquamish participants are starting to see respect for their culture and traditions grow especially among the youth. Basket weaving has seen a return to traditional thanking the cedar, wrapping the bottom with part of the cedar bark, and offering tobacco to the cedar for its sacrifice. There was much positive response on “Cultural Use-Spiritual/Cultural needs” being included.

Education. The discussion around the Education indicator captured the differences in perceptions among

the four workshops. LEKT workshop participants discussed misconceptions and prejudice against Native Americans that are reflected in schools. Some participants felt that Native children are questioned about the validity of their sources when presenting their oral histories at school.

At PGST, one participant was pleased with youth getting involved with their culture. “Our kids view clam digging and shellfish harvesting as our cultural tradition more than other neighboring Tribes.”

At Stillaguamish, one participant noted the lack of youth involved in the survey. “The current generation has eyes closed and ears shut. Those under 18 are vocal and I would be interested to see how they view these questions compared to older ones’ responses.” One participant noted how the youth are not learning the traditional ways, and how it impacted the community’s physical health. Technology, fast foods, lifestyles, and economics were discussed as barriers to learning traditional ways.

Self-determination. The Elwha River dam removal¹⁹ has been positive for self-determination for LEKT, and many LEKT participants were proud to see it has become an internationally recognized fish habitat restoration project.

“When I was a kid in summer school, Elders would take us to get seafood we no longer eat or gather like octopus, Chinese slippers—teaching how to do it. Now in marine science class, kids say ‘Oh gross.’ We need to take kids and teach them about gathering again.”

Even if there is an interest in gathering seafood or traditional foods, many find it hard to find the time to fit it into their schedules. “We started working and didn’t have time to get seafood like we were used to, it ended up being a treat. I realized the kids were missing out and tried to do more gathering so children could eat more traditional food.”

Suquamish participants remarked that “Economic” needs to be taken out of the development attribute.

Well-being. Many participants were concerned about seafood quality affecting their well-being. A participant remarked that their connection to the environment was impacted by access, as they “could no longer camp in places that they could in their youth.”

One participant remarked on resilience “As long as Tribal people stay strong and support each other it will be OK. Follow our regulations then the resources might be there for the future. Tribes keep over-harvesting—limited dam removal—we will die trying.”

The IHIs received some critical feedback from participants. One PGST Elder noted, “I don’t know what to think about what we just did. Is the community represented? Did we understand the questions?” Some participants noted they had difficulty evaluating some of the indicators

because of unclear definitions. Some participants thought that the indicators needed to better incorporate upland knowledge into the scenarios and questions such as traditional plants (e.g., cedar, nettles, and berries).

DISCUSSION/CONCLUSION

We developed the IHIs to help bridge the divide between Western science health assessments and how Indigenous worldviews evaluate health and wellbeing. Results from the IHIs could be employed in parallel with conventional assessments to increase understanding of impacts and priorities in Indigenous communities and improve decision-making. A large measure of the IHIs’ success lies in the ability to engage community participants in deliberating common understandings and definitions of Indigenous community health. Based on participants’ willingness to complete the questions and the positive feedback received after the workshops, the rankings/weightings appear to resonate with Coast Salish Tribal members.

The results of the four workshops demonstrate that the indicators and attributes are useful in communicating what participants feel are important in the context of health and well-being. Some indicators were commonly ranked as most important across all workshops. There were common themes discussed in all four groups. There are common values and concerns among workshop participants from all four Coast Salish communities such as resources security, cultural and ceremonial use, restoration, community connection, and improved access to resources.

However, priorities differed even though the same scenarios were presented. Participants engaged with each other to understand and define the indicators and attributes through the lens of personal, family, and community experience and history. Through the discussion, participants considered what factors can be used to assess the overall health of the community and how the indicators and attributes may influence each other. The differences demonstrate that each community has unique worldviews and priorities, therefore, one cannot draw generalizations across even neighboring Indigenous communities. The differences found between scenarios highlight that the IHIs can distinguish aspects of health and well-being specific to that scenario, therefore it is not possible to generalize a set of IHIs for all possible scenarios.

The results from the workshops indicate that the IHIs can bring decision-making power back to the community (Fig. 3). The format allows the community to interpret their results and reflect on priorities of how to address the issues rather than placing the decision-making power with an outside researcher, who may have limited understanding of the community or hold (often unknown, or unrecognized) biases. Incorporating the IHIs can provide both a more comprehensive understanding of Indigenous health concerns and a means for Indigenous peoples to become more equitably involved in health evaluations. To the authors’ knowledge, there are no other recognized indicators of Indigenous health that are in use today.

¹⁹“Elwha River Restoration—Olympic National Park (U.S. National Park Service),” accessed January 14, 2024, <https://www.nps.gov/olym/learn/nature/elwha-ecosystem-restoration.htm>.

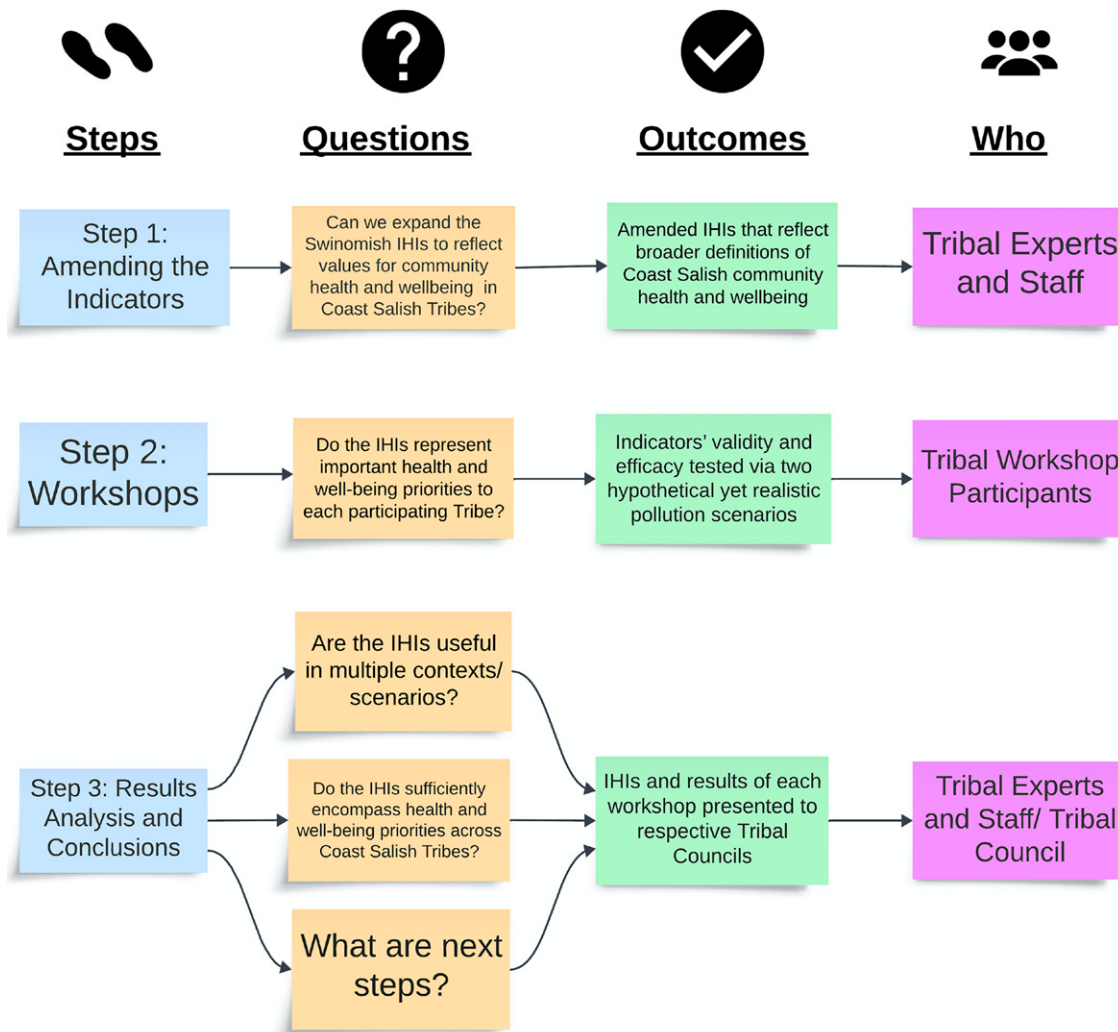


FIG. 3. Steps to tailor and test the effectiveness of the Indigenous Health Indicators (IHIs). Modified with permission from Figure 3 in Donatuto *et al.* 2020.

A further measure of the usefulness of the IHIs is their adaptability to a wide array of decision-making and priority-setting contexts. The indicators can be amended to reflect each Tribe's worldview. Each time the indicators are used, they will be informed and refined by the individuals' and community's history and current experiences, as well as their visions and hopes. Developing shared expressions of value, whether within a Tribe or representative of collective Tribal values, provides a strong base for Tribes to establish priorities in allocating, protecting, and restoring resources.

Workshop participants and Tribal leaders indicated interest in further exploring how this tool may be used. PGST has used the IHI methodology to evaluate community perceptions of climate change risk assessment. Several Suquamish Tribal Council members voiced interest in how the indicators could be used to identify and express community concerns and priorities. Suggestions included allocating harvesting and staff resources, establishing cultural program priorities, and negotiating environmental remediation and restoration actions. The Stillaguamish Chairman suggested

using the IHIs to help with community planning for ceremonies and a youth program.

These workshops were part of a refining process for the IHIs and we are thankful for the Tribal community members who participated. The IHIs have since been tailored and employed in diverse locations across North America by Indigenous communities evaluating a broad range of contexts. One community in North Carolina has considered the IHIs as a foundation to demonstrate health from a positive point of view to uplift community members in prioritizing their health and well-being and to offset the slew of negative metrics publicized by the local county health department. An Indigenous community has adapted the IHIs to assess the impacts of oil tanker traffic in British Columbia, Canada.²⁰

²⁰Tsleil-Waututh Nation Sacred Trust initiative, "Assessment of the Trans Mountain Pipeline and Tanker Expansion Proposal," May 26, 2015, <https://twnsacredtrust.ca/wp-content/uploads/TWN_assessment_final_med-res_v2.pdf> (Last accessed March 15, 2024).

Additional research evaluating whether these indicators would be useful in diverse geographic regions is needed. The work has only yet begun.

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