Literature review: Framing air quality and environmental health

October 2020

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Introduction

Good air quality is essential to the health and wellbeing of all New Zealanders. The overall objective of the HAPINZ 3.0 research is "to identify the effects of air pollution throughout New Zealand, link these effects to the various sources and levels of air pollution, and provide information to assist in the formulation of effective policy that will lead to real and measurable improvements in the health of New Zealanders" (HAPINZ 3.0, 2019, p.12). A key component to enable these changes is to improve the public's understanding of the complex relationship between air quality and environmental health so as to activate their support for necessary policies and practices to build healthy environments. This can be done by using evidence-led strategic framing and communication strategies to deepen the public's thinking to align more with how experts understand the issues.

The Workshop was commissioned to undertake a literature review to outline available narrative strategies to help the public better understand the links between air quality and environmental health. This review builds on earlier work done for the HAPINZ 2.0 research and outlines more effective approaches to communicating the results of the HAPINZ 3.0 research. The aim is for the HAPINZ 3.0 findings to be accessible to a broad audience, to build public support for environmental health measures, and to influence good policy development.

The review is organised by The Workshop's evidence-led framework of narratives for change which covers key framing techniques including audience, vision, values, explanations and storytellers/messengers.

Summary of review recommendations

1. Focus on your audience

- Understand who your audience is and tailor your communications specifically for them to be more effective.
- Use two-way communications developed in collaboration with communities and those with health vulnerabilities that are most affected by air pollution and air quality issues.
- Make sure you are telling your story – and giving essential information – to those who are open to persuasion.
- A powerful form of communication is to show communities that something is being done about a problem through actions and policies. This also addresses perception gaps in your audience.
- Make sure you are taking your audience's cultural beliefs and understandings into account when developing your communications.

2. Lead with a vision for a better world

- First, ask communities what they want for air quality and their environmental health then make sure your communications align with their vision.
- Focus on positive communications based on transformative visions for the future that motivate people to action. For example, frame your communications about environments that are calm and pleasant where people can move about freely and be in good health.
- Provide social proof of systems change. For example, temporary reductions in emissions during COVID-19 lockdowns gave people a glimpse of an alternative future of better air quality. Social proof is useful if researchers need the public to take a specific action with policy makers.
- There is also an aspect of experiential learning where people can be influenced to focus on the long-term future and make more sustainable decisions when they are exposed to more natural and green spaces.
- Do use a frame of capability that encourages helpful thinking that we can work together to solve the problem as we have done together with other problems before.
- Do not use frames of fatalism or normalcy bias that tap into unhelpful thinking about the problem of air pollution as a necessary consequence of progress, always going to exist and unable to be solved.

3. Use intrinsic values to make it matter to your audience

- Lead with **intrinsic values**. Emphasise **fairness between places** – this equality value encourages helpful thinking about the collective responsibility and importance of everyone having environmental health conditions for good health and wellbeing. It helps people understand that working to improve environmental health in one place does not take away from others.
- Use care for the environment as an intrinsic value.
- Use values that will connect with people's emotions.
- Avoid extrinsic values. Don't use security values or fear framing that fosters unhelpful thinking about individual's lack of self-efficacy and control over air quality. These values move people to seek simple solutions like denying the problem, not complex policy change solutions. For example, don't emphasise how emissions may impact people's material wellbeing as it reduces willingness to take action.
- Avoid talking about individual responsibility for managing exposure to air pollution.

4. Provide better explanations

- Use better explanations about the health impacts of air pollution. For example, talk » about the long-lasting effects of air pollution on the brains of children and older adults, as well as the respiratory and cardiovascular problems it causes.
- Present your research findings in a clear explanatory chain of cause, effect and solution, rather than just describing the problem. Start with people's visions/hopes/desires to remind them what they want for their air quality.

- Avoid communicating about air pollution as invisible and instead talk about it as something concrete and physical.
- Use helpful frames of health and wellbeing, a common good, and public health to motivate people.
- Use motivational rather than sacrificial frames. Use specific agentive language to increase people's sense of competence. Name the agents responsible for helping make change so as to not individualise the action. For example, ''I can reduce my emissions if people in government also make changes to cities".
- Avoid using 'loss' frames so as to be solutions-oriented in your story logic. For example, when discussing the costs associated with reducing emissions, rather than emphasising the loss of future income which is an individualistic frame, talk about a 'foregone gain' - a smaller increase in future income.
- Use metaphors and tested visual images. For example, exposing people to nature scenes can help people be more future-oriented about decisions to improve air quality.

5. Use diverse storytellers

- The messengers selected to deliver communications will be more effective if the target audience recognises them as part of their own group. They are better able to tap into the cultural understandings and mental models people use.
- Use a wider variety of trustworthy messengers to speak on environmental health. This helps to make its importance and function clearer to the general public.
- Identify the communication channels commonly used to disseminate information in a community.
- Collaborate with communities on message design and delivery.
- Communicate about others' willingness to make policy changes. This is more effective in gaining support than providing negative information about the problem.

Research question

In line with the research brief and The Workshop's theory of strategic communication, the broad aim of the literature review was:
To map the landscape of current framing and communication strategies that are effective for helping people to think productively about air quality and environmental health.

We were interested in what framing strategies help:

- people understand why they should be concerned with how air pollution affects their health,
- and build public support for policies and practices that support healthy environments.

Search strategy

The review identified the available evidence on effective narrative strategies to talk about air quality and environmental health as it relates to air pollution and emissions. An initial list of keywords related to this specific topic and to The Workshop's approach was drawn up. These search term combinations are shown in Table 1 below. A scoping search was then conducted using these combinations on the PubMed, Google Scholar and Scopus databases. Potentially relevant articles were screened for mention of The Workshop's key search terms such as messages, narratives, framing, values and futures. Search combinations were discontinued after three consecutive pages with no relevant results. The initial set of references were cross-checked in Google Scholar to see if they contained or were cited by relevant references. The scoping review returned 110 possible articles which were then further evaluated for their direct relevance to the topic. These were narrowed to 40 that were directly relevant.

As well as the articles identified by the scoping review, relevant grey literature from The Workshop and other organisations such as The Frameworks Institute, and other framing and narrative organisations that work on effective strategies for deepening people's thinking on complex issues, has been included where it applies to air quality and environmental health.

Table 1: Initial search term combinations and results

	AND										
TOPIC	Message/ing	Frame/ing (analysis)	Value(s)	Vision(s)	Communication(s)/strategy/ies	Narrative(s)/cultural	Metaphors	Decision/making	Future(s)	COVID-19	
Air quality	3	3	1	3	2	1	0	5	2	2	
Air pollution	6	1	0	3	2	3	0	6	2	5	& emissions (2); mental health (1)
Emissions	4	2	1	2	1	0	0	2	0	0	
Environmental health	4	7	5	0	2	4	1	3	0	0	& social determinants (1); cultural models (1)

Review contents

There are relatively few peer-reviewed studies at the intersection of air quality, environmental health and narrative strategies that examine current framing strategies for helping people to think productively about air quality specifically. Much of the literature focuses on air quality measurement and monitoring, health risk assessments and environmental risk communications which, although related to the topic, was less useful for making conclusions about effective communication techniques to elicit helpful thinking in the public.

In keeping with The Workshop's evidence-led framework of effective narrative strategies, emphasising the importance of framing, the review has drawn from the available literature on air quality and emissions as well as the related climate change sphere.
We looked for examples of:

- appeals to intrinsic values
- universalist, that is, human rights framing of environmental health and climate change issues
- communications that encompass vision making and are solution-led rather than problem-led
- any examples of framing and messaging approaches that were part of successful change processes.

The impact of COVID-19

Everything that we communicate lands into an existing landscape of understanding. How might the COVID-19 pandemic influence this landscape?
One important development during this review was the impact of the COVID-19 pandemic upon environmental and human health. There is a growing body of literature that details two specific aspects of this. First, there is some evidence that exposure to air pollution and poor air quality may contribute to a higher COVID-19 mortality rate. This effect had already been noted during the Severe Acute Respiratory Syndrome (SARS) pandemic of the early 2000s (Cui et al., 2003). Of particular relevance to this review, studies are finding that short- and long-term exposure to air pollution such as fine particulate matter ($PM_{2.5}$) (Wu et al., 2020; Zhu et al., 2020)) and nitrogen dioxide (NO_2) (Ogen, 2020) contribute to a higher COVID-19 mortality rate. There appears to be a higher death rate in regions with high levels of air pollution (Conticini et al., 2020). Research shows the public already understands the importance of environmental health (Lindland et al., 2011, p.22), and the immediacy of the link between COVID-19, air quality and mortality rates highlights the need for solutions to improve this.

The second related aspect of COVID-19 is that measures that some governments undertook to reduce the spread of COVID-19 had a material impact on the environment, for example, through a reduction in air pollution due to a drop in traffic in many places. The literature notes that government restrictions in countries such as China led to a decline in industrial and urban activity and, concurrently, air pollution (Wang et al., 2020). However, researchers warn that the short-term positive impact of COVID-19 on air pollution and reduced greenhouse gases will not last once government restrictions on activity are removed (Zambrano-Monserrate et al., 2020). What the reduction in air pollution may have done is

enable a shift in the public's thinking away from what FrameWorks calls "determinist thinking about environmental health" (FrameWorks, 2014, p.3), an acceptance of health hazards like air pollution as unavoidable consequences of economic progress. Instead, it has provided a window of opportunity to show that government regulations that lead to positive human and environmental health benefits are possible.

Gaps in understanding

Gaps in understanding are "those places where the cultural models employed by the public to think about an issue differ significantly from experts' understanding of the same issue" (Bales & Lindland, 2014, p.11). The role of effective and strategic communications is to frame the issue in such a way as to bridge the gap between the public and expert understandings through better narratives . **Some examples of unhelpful thinking related to environmental health are**:

- The *Environment/Environmentalism Gap:* the public may not even understand the definition of environmental health and how it relates to other issues.
- The *Health/Health Individualism Gap*: the public assumes environmental health relates specifically to healthcare and individual responsibility for health rather than systemic factors.
- The *Scope Gap*: the public conceptualises environmental health as related to local threats such as toxic contaminants rather than broader systems level factors, which limits the scope of actions to solve the problem.
- The *Nature of Work Gap*: the public does not understand the ongoing nature of environmental health work. (pp.11-12)

Wu et al. (2017) investigated the gaps in understanding of environmental health issues between professionals and the general public and observed that, in line with what FrameWorks has found, there were differences in what environmental issues urban and rural communities and environmental health professionals prioritised. In this case study, air pollution ranked highly as a problem for urban dwellers, whereas rural communities were more concerned about water and sanitation issues, and factory pollution. Professionals considered food safety and water and sanitation issues pressing issues. Some of the differences are explained by the different risk perceptions of different stakeholders. While ensuring that any interventions are evidence-based they should also account for acceptance of the community based on what they perceive threat. This highlights the need for environmental health professionals to better understand these differing perceptions so as to better tailor environmental health communication strategies. This requires better engagement with communities and will also enable professionals to demonstrate their capacity for addressing these threats to communities.

Related to the issue of differing risk perceptions, Hooker et al. (2017) aimed to identify key principles for best practice in risk communications on issues where the public concern is high but the actual environmental health risk is low. They argue that "risk communication requires a significantly different mindset – one in which the rules of engagement are not founded on the primacy of risk assessment evidence, but rather on a range of evidentiary, cultural and economic considerations". In cases where

there is potential for what they term “high outrage”, it is better to address that rather than debate the facts of the environmental hazard itself. Their key principles are:

- Actions and policies are the strongest form of communication: This shows the community that something is being done.
- Tolerate early overreactions: This allows them to subside quickly.
- Communicate early and often: Communicating essential information quickly “enables experts to capture the issue”.
- Use your communities: “...much of how people feel and react is determined by their social networks, culture and society” and this “enhances public trust by making communal values tangible, and improves public compliance by connecting risk management to these values”.
- Meet the needs of the media: This maximises the impact of mass media communication.
- Look to communication science when constructing messages: Use ‘gain’ rather than ‘loss’ frames; be careful in the use of statistics and numbers; craft messages in accessible language (see the discussion of foregone gains in the section on frames); use visual formats.

The importance of communities, collaborations and coalitions

Several studies addressed the process of developing two-way communication strategies in collaboration with communities so we have also included these to highlight good processes to undertake.

A crucial factor for achieving positive environmental health outcomes is found in collaborations and coalitions between communities, researchers and policy makers. Garnett et al. (2018, p.22) argue that stakeholder engagement allows researchers to become “honest brokers” in terms of delivering environmental health science evidence that can influence policy. They explored ways of framing air pollution and its health effects to make the connection more visible. They state:

> Tracing who and what is not included in accounts of impact, and the people, processes and things that lie outside of each performance of impact (what is not explicitly valued) can also point to other practical ways of achieving impact, and thereby offer opportunities to challenge and re-figure dominant models of science and science translation. (pp.25-26)

One way to ensure the applicability of environmental health research to communities is through collaboration. De Souza et al. (2013) draw on the experience of a community organising agency that specialised in bringing researchers and communities together through tailored communication strategies. As well as benefiting the community by providing clear opportunities for their input into the research, this input meant policy makers had better grounds upon which to make their decisions. The community organising agency helped to translate scientific information through visual methods so the community was able to access it more easily and understand its complexity. Although specifically related to health, another example is that of the transition from health promotion activities to policy advocacy by communities in partnership with university researchers on the issue of diabetes and health behaviours (Hill et al., 2007). The coalitions were able to make this shift by realising that “local involvement in and awareness of policy activities was important for sustaining long-term projects”. They

did this through working to increase public health awareness in the coalition which led to community-based policy changes and changes in health. This model of change is shown in Figure 1 below.

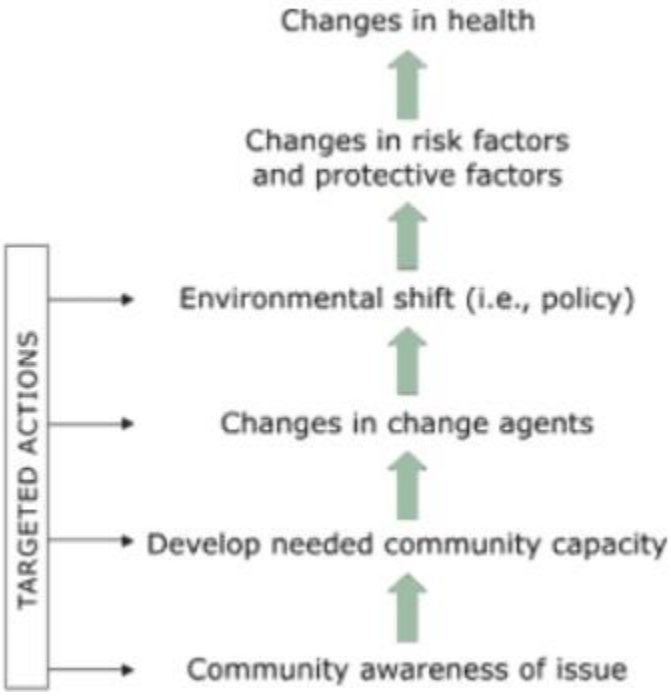

Figure 1: The Racial and Ethnic Approaches to Community Health (REACH) 2010 Model of Change (Source: Hill et al., 2007).

Several studies focused on communications to the public about air quality and its measurement. Wartenburg (2009) highlights the different communication considerations including specific communication goals such as conveying the health impacts of air quality to support "possible policy considerations and protection of public health", identifying the intended audience to craft specific communications, and understanding the objectives of major messages. He also notes the importance of collaboration saying that, to "be acceptable and effective, communication tools and approaches should be developed jointly by scientists and stakeholders". Likewise, McEntee et al. (2013) compared one-way and interactive two-way communication approaches in two contentious public health campaigns in Aotearoa New Zealand. They concluded that utilising a combination of both approaches, as well as facilitating complex solutions, can "enable those affected by actions to mitigate the impacts of environmental issues, to be both informed as well as engaged in campaigns, not just subjects of persuasive messages" (p. 75). Figure 2 below shows that if the goal of the campaign is to develop complex solutions then the level of community interaction required through communications is high, meaning two-way communication is most appropriate.

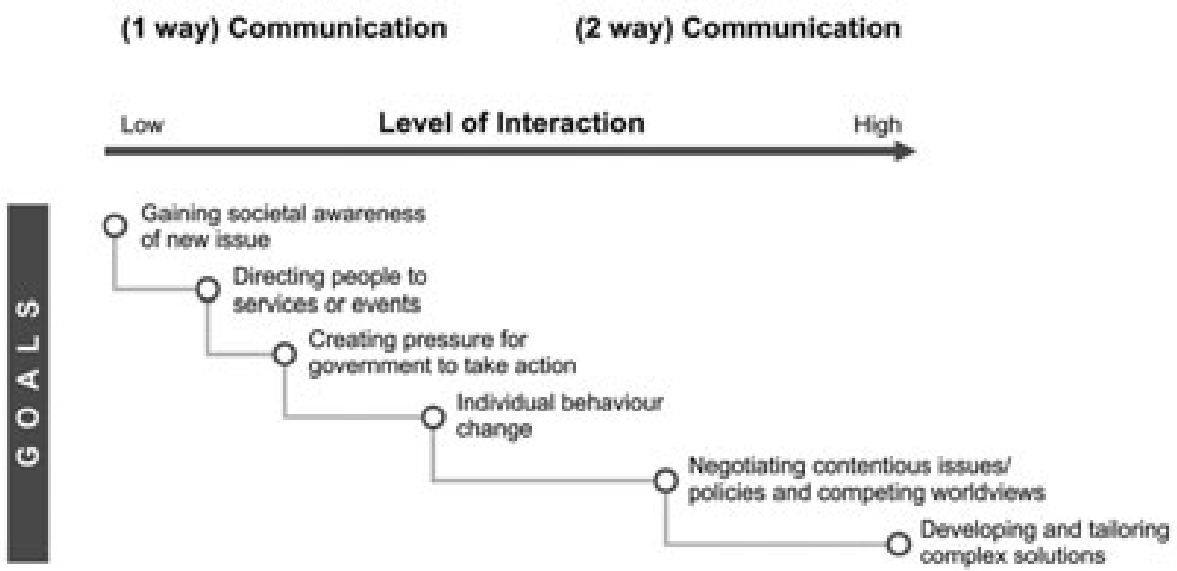

Figure 2: Type of communication for different campaign goals (Source: McEntee et al., 2013, p.74).

Oltra and Sala (2014, p.21) investigated communications to foster public engagement on air pollution with the four main outcomes of 1) increasing the awareness and understanding of air pollution and its health impacts, 2) risk perception and worry to modify individual beliefs, 3) motivating individual actions to reduce air pollution, and 4) motivating individual actions to minimise exposure to air pollution. They explain that one reason there is limited public understanding of the links between air pollution and health is that it is "invisible" leading people to attribute negative health outcomes to other causes such as poor housing (p.12). Oltra and Sala discuss the need for public participation in environmental decisions to incorporate local knowledge in these, and in scientific research to support two-way discussions.

Nieuwenhuijsen et al. (2017, p.68), supporting the notion of stakeholder participation, state that this is important to create "an environment of collaboration and feedback and guaranteeing public acceptance of proposed policy measures". They use the example of health impact assessments of air quality and emissions to demonstrate this, maintaining that the process of conducting projects is just as important as what is produced at the end as this can also answer critical questions such as "how different disciplines/sectors can effectively work together and develop a common language" (p.68). Their "full chain" approach for stakeholder participation throughout this process is shown in Figure 3 below.

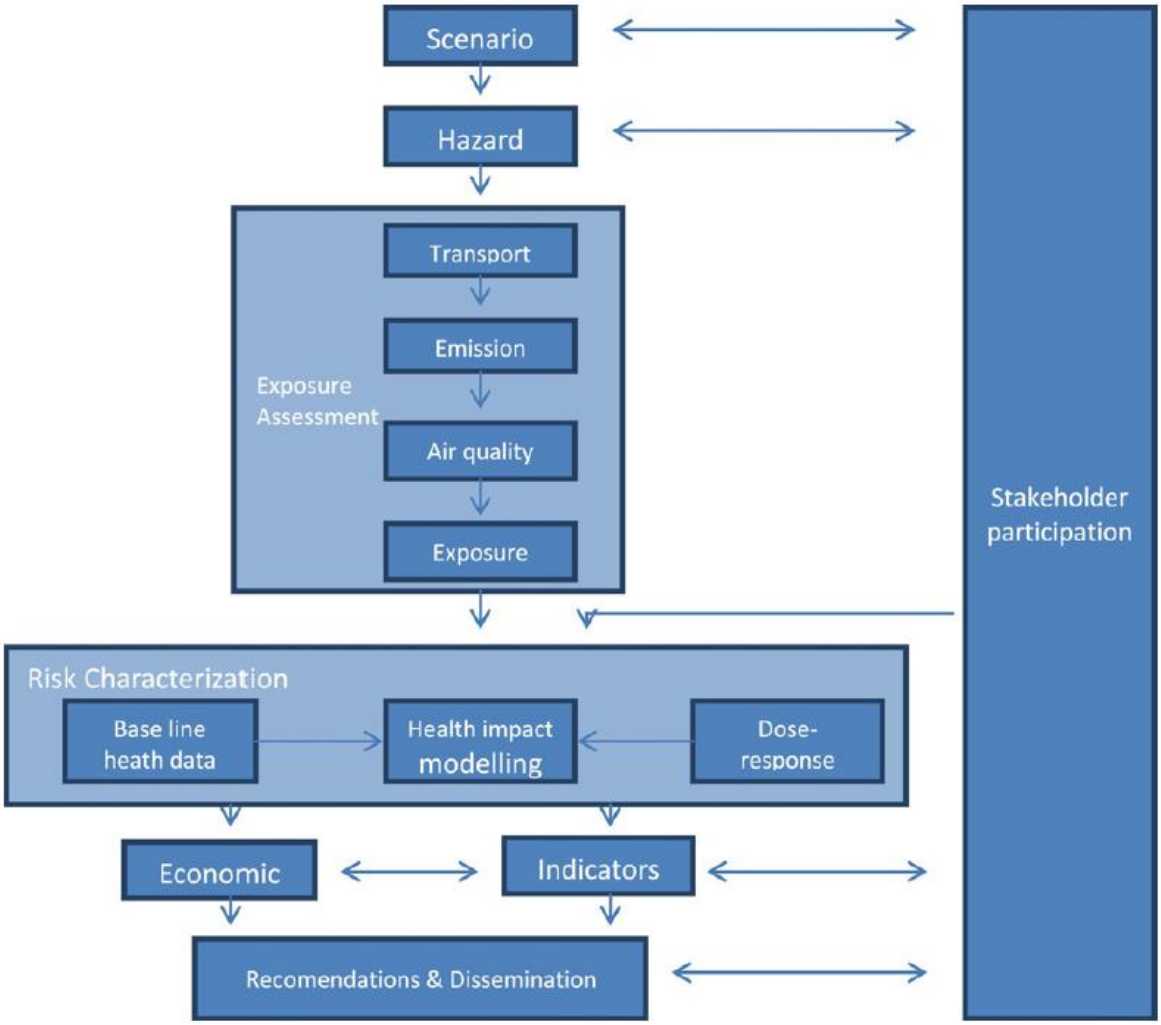

Figure 3: Participatory full-chain health impact assessment with an example for air quality (Source: Nieuwenhuijsen et al., 2017, p.66).

Culturally-informed risk communication strategies are those in which an audience's cultural beliefs and understandings are taken into account when developing health risk communications. Mundorf et al. (2017) conducted a case study of low-income women and explored their shared cultural understandings of how to manage air quality threats. The women used two models to do this. First, even though they didn't spend a lot of time discussing air quality, one group of women relied on their social network of family and friends to share how to manage risk. Second, another group made use of official information. However, their risk perceptions were affected by sociocultural factors such as their past experience with environmental health hazards and their distrust of government sources of information.

Frames and framing

Much of the literature relevant to this review examined the element of specific strategic frames and framing techniques used in both environmental health and climate change communication and research.

Air quality and air pollution

When examining the demographic and psychosocial factors related to how the general public adheres to air quality warning systems, D'Antoni et al. (2017) identified a number of barriers to adherence. One barrier related to framing of air quality was "being exposed to health messages that reduced both concern about air pollution and perceived susceptibility, as well as perceived lack of self-efficacy/locus of control". They argue that the public is less likely to change their behaviours to avoid poor air quality when they don't see air pollution as a personal risk with associated direct short term health effects. As well, fear framing is only effective if advice to manage the health risks of pollution is also provided. Otherwise, the public feel they lack self-efficacy.

Johnson (2012) undertook research into the effectiveness of risk communications about air pollution to encourage protection behaviours such as sheltering indoors when air pollution levels were reported to be high. Rather than being guided by official communications based on air quality index measures, people more often used their own sensory and health cues to make judgements about staying indoors. He concluded that, to be more successful, message design needs to be more sophisticated to bridge the gap between mental models about the health impacts of air pollution held by experts and the public. This may require adding explanations that air quality indices do not track specific health effects and targeting information for audiences with health vulnerabilities.

A study by Kotcher et al. (2019) identified a set of specific messages about "the health implications of air pollution from fossil fuels that are most and least concerning to people" specifically related to the "neurological health harms of air pollution from fossil fuels". They discuss the research that shows that communicating about the consequences of climate change upon health, and more specifically, the health effects of air pollution from fossil fuels appears to be an effective strategy to increase support for policies to address this problem. Their work concluded that:

> ...it is also important to talk about how air pollution can have long-lasting effects on the brains of children and older adults, the toxic chemicals in air pollution that lead to neurological harm, and to address more well-established forms of health harms from air pollution such as respiratory and cardiovascular disease.

The impact of the message, especially as regards to neurological damage to the brains of babies and young children, was to increase support for clean energy and decrease support for fossil fuels. They recommend finding visual methods to communicate about the health effects of air pollution in addition to written communications.

Loroño-Leturiondo's (2019) research also supports the view that communication between experts and the public is best conducted in two-way formats such as through social media and educational

programmes to facilitate dialogue between the two groups. She supports the notion of using different information sources, different communication formats or media, and different messages for segmented audiences (pp.218-219), along with other work that emphasises the need to tailor messages for specific stakeholders. Focusing on positive communication about air pollution can motivate people to action "along the lines of an exciting transformation and future" (p.220). She recommends providing information about the individual consequences on people's health but avoiding communicating about air pollution as "invisible" and instead framing it as "something physical" (p.221). Another way to make the issue more specific is to frame it around "calm and pleasant environments where people can walk freely without being in a constant state of alertness for fear of cars" (p.221). The "health and well-being frame" is also worth using to further motivate people into using active transport (p.221).

A recent study by Berry et al. (2019) investigated the impact of "visual exposure to natural vs. built environments" on people's decision-making about improved air quality. They found that "viewing nature scenes can cause people to be future-oriented in their approach to air quality decisions". There is some potential to influence people to be more focused on the long-term future, and make decisions such as to walk or use public transport, by exposing them to more natural and green spaces. This has implications for how society may choose to structure environments to cultivate more sustainable decision-making.

One consideration is the role of the media in framing environmental health issues. This affects the public's view on who may be responsible for addressing these. In one study, Mello and Tan (2016) examined how the media framed a range of paediatric environmental health issues and how this impacted mothers' feelings of personal responsibility. They pinpoint the opportunity for communications about environmental health to shift away from personal responsibility, in this case of mothers, towards the collective responsibility of society to address issues. They recommend the use of "inoculation or narrative messages as counter frames" in the face of messaging from lobby groups to prevent policy change. In this way broader support for policy change can be mobilised. Niederdeppe et al. (2015) explain that inoculation messages "protect people from future attempts at persuasion by warning them that others will attempt to persuade them (forewarning) and exposing them to and refuting anticipated opposing arguments". Narrative messages are "stories that focus on a character...to describe how that character interacts with their social and physical environment and thus convey systematic information about health and social issues".

Mossler et al. (2017) examined the effects of five different frames on public support for carbon emissions reduction policies. These were air pollution, carbon pollution, climate change, global warming and ocean acidification. They contend that a lack of support for mitigation policies is because the frames used to discuss these, such as global warming and climate change, are linked to political ideology. Using different frames that are not associated with a particular political perspective may garner greater public support for the required policies. Framing works by two "mechanisms of influence – accessibility and applicability" (p.63). Accessibility makes it easier for the public to consider issues when they are making a judgement and applicability relies on mental models that the public holds. They suggest that the effect of the frames is moderated by mental models and attitudes, including political ideology and climate

change beliefs, already held by the public. Interestingly for this research, Mossler et al. found that the air pollution mitigation frame engendered the highest mitigation policy support despite the political ideology held. Air pollution appeals to existing mental models due to its negative association as a major environmental and public health issue. When climate change is framed as a public health issue, it can engender support for mitigation, so linking air pollution as a health issue helps foster this support.

Climate change

The related literature on climate change provided useful findings. In drawing on psychological science for insights into how to improve public engagement on climate change, van der Linden et al. (2015, p.758) identify five key practices. These have utility in the air quality and emissions space also.

They suggest avoiding framing climate change as something that is an analytical future risk that is non-urgent and non-personal. Instead, policymakers should:
(a) emphasize climate change as a present, local, and personal risk
(b) facilitate more affective and experiential engagement
(c) leverage relevant social group norms
(d) frame policy solutions in terms of what can be gained from immediate action
(e) appeal to intrinsically valued long-term environmental goals and outcomes.

Table 2 below shows each of these five recommendations, alongside the relevant psychological lesson that it aims to address, as well as a practical example in action.

Table 2: Overview of key psychological lessons and policy advice

Psychological lesson	Policy guideline	Example policy recommendation
1. The human brain privileges experience over analysis	Highlight relevant personal experiences through affective recall, stories, and metaphors.	The National Park Service (NPS) gives concrete examples of how climate change has already harmed natural resources in specific parks.
2. People are social beings who respond to group norms	Activate and leverage relevant social group norms to promote and increase collective action.	Government climate science agencies could improve efforts to highlight descriptive norms (e.g., the scientific consensus on human-caused climate change).
3. Out of sight, out of mind: reduce psychological distance	Emphasize the present and make climate change impacts and solutions locally relevant.	NASA and The National Oceanic and Atmospheric Administration (NOAA) are supporting efforts to enable TV meteorologists to educate their viewers about current local climate change impacts.
4. Nobody likes losing but everyone likes gaining	Frame policy solutions in terms of what can be gained (not in terms of what is lost).	The Environmental Protection Agency's (EPA) "Clean Power Plan" focuses on cleaning up the nation's fuel supply, which will help clean up the nation's air and water, providing direct health benefits to all Americans.
5. Tapping the potential of human motivation	Leverage intrinsic motivation to support long-term environmental goals.	The President, Congress, and all federal agencies should be openly aspirational in designing climate policy initiatives that tap into citizens' deeply held motivations for building a better tomorrow.

(Source: van der Linden et al., 2015, p. 761).

Levine and Kline (2017) also stress that policy change is more likely when "public opinion and collective action exert pressure in support of particular goals". It follows that climate change framing should then aim to shift public opinion and understanding alongside encouraging political action. Levine and Kline evaluated the effectiveness of political frames and caution against using those that "heighten people's concern about climate change yet decrease their rate of political action to express that concern". An example of frames that decrease political engagement are those that emphasise how an issue affects people's material wellbeing. This reduces willingness to spend limited resources on activism. In their research, they tested two climate change threat frames: one about personal health and one about food security. Both frames were persuasive but were also paralysing in terms of political action so are not recommended. More research is required on frames that can both shift public opinion and foster greater collective action on climate change.

In line with the need to tailor frames for different groups, Pascal et al. (2019) point out that while using health message framing to discuss climate change may elicit positive responses, this framing does not necessarily lead to support for mitigation policies. They recommend the "framing of climate change and health impacts for different stakeholders" as well as advocating for the reduction in both air pollution and greenhouse gases. Likewise, Hart and Feldman (2018) carried out a study looking at discussions of power plant emissions using a climate change or an air pollution frame. As already discussed, in a context where climate change is a politically polarising issue, communication strategies have shifted away from framing climate change itself towards framing its possible solutions. This aligns with the approach used by The Workshop and other organisations to make communications that are "solution led" (The Workshop, 2019, p.10; The Workshop & Grey, 2020, p.10) at the systems level (Bales & Lindland, 2014, p.24; Lindland et al., 2014, p34). Hart and Feldman's (2018, p.6) research showed that

"discussing power plant emissions in terms of climate change, rather than air pollution, had an overall negative impact on policy support", particularly among the politically conservative group. Avoiding mentioning climate change and instead highlighting the non-climate related co-benefits may help promote support for policy actions amongst this group. This will require a thorough understanding of the stakeholder groups to which communication strategies are aimed.

In looking to understand the liberal-conservative ideological divide over climate change opinion, and its possible influences, Jacquet et al. (2014) examined "top-down" and "bottom-up" factors. What they found in the studies that they reviewed is that bottom-up influences such as the liberal-conservative inclination of the audience interact with how these different audiences process top-down information from sources such as the mass media. These interactions are shown in Figure 4 below. One implication for how messages are framed to boost support for policy change is that fear based messages impact negatively on more conservative audiences who then engage in denial. Messages that are framed around "self-efficacy" – or a person's belief in their ability to control their behaviours and environment – give people a sense that they have some control over a situation.

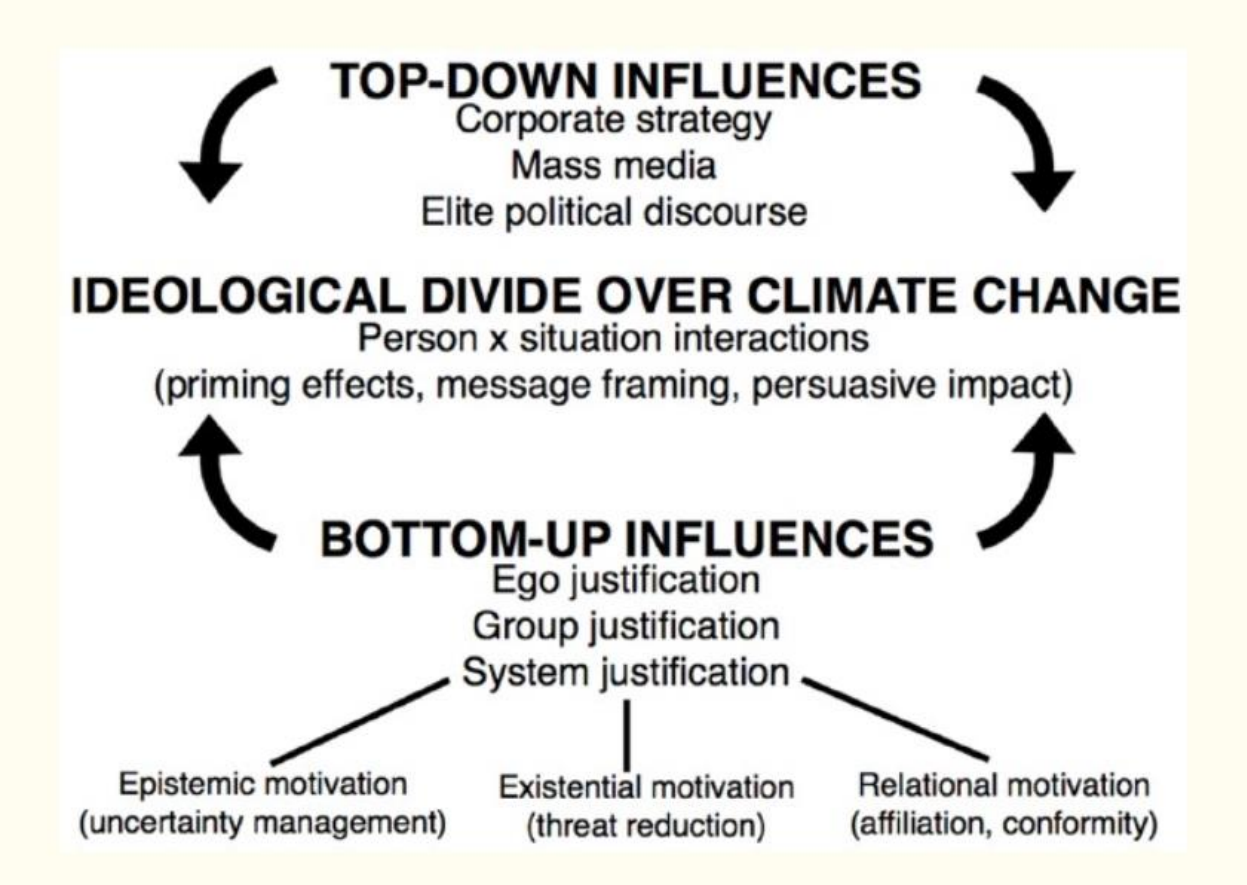

Figure 4: Contributions of top-down and bottom-up influences to the ideological divide over climate change (Source: Jacquet et al., 2014).

As has already been noted, research shows that public understanding about issues such as climate change is influenced by the message framing that is used such as public health versus environmental health framing. Schuldt et al. (2017, p.1) introduce the concept of "intersecting frames" – where frames may occur at the same time – and examine what impact these interactions may have on audience understanding of environmental risk communications. They use the interrelated ideas of emphasis framing, which is "when the same issue is described using different sets of readily applicable concepts that invite distinct connotations and interpretations" (p.3) and issue labels which are "used to represent the issue in discourse" (p.1). Frames and labels can evoke different effects and understandings in the public when used separately. The way that intersecting frames interact to influence public thought and understanding, with different effects, is shown in Figure 5 below. What they found in their research was that when public health framing intersected with climate change labelling, this tended to increase uncertainty about climate change in those that tended towards political conservatism. This highlights the need to be aware of the interaction between two or more frames and labels in any risk communications, as well as their effect on different audiences.

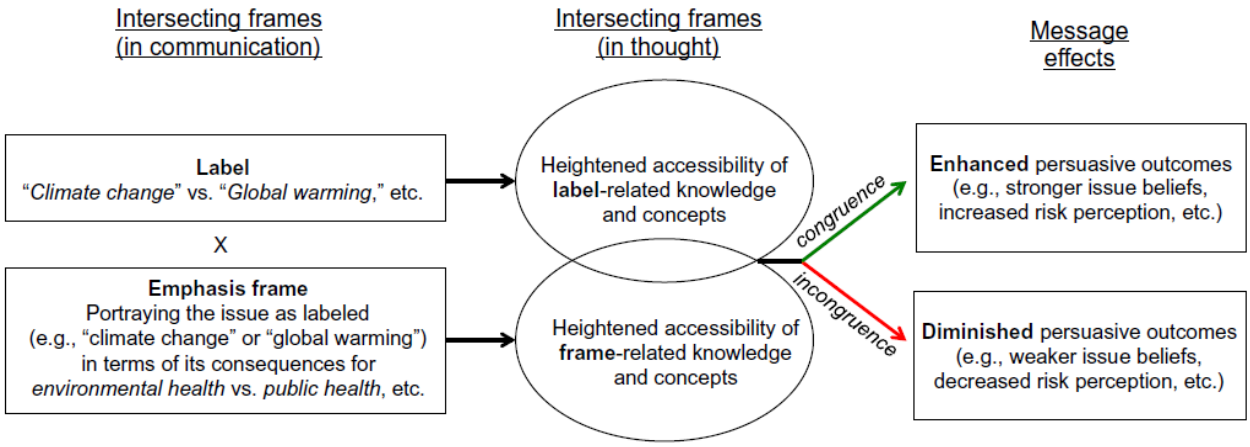

Figure 5: Conceptual model of intersecting framing effects (Source: Schuldt et al., 2017, p.4).

Research into the effectiveness of different frames to shift people's understanding explored the effect of a climate change denial counter-frame on people's support for emissions reduction policies. McCright et al. (2015) found that public support for these policies increased when an economic opportunity frame and a national security frame were used but the effect of the positive frames was moderated by the climate change denial frame, showing that there needs to be awareness of the presence and influence of any negative frames on policy support.

When examining the difference between motivational versus sacrificial message framing on people's behavioural intentions regarding climate change, Gifford and Comeau (2011) determined that motivational frames are more effective to increase engagement of communities in climate-related actions. There were audience differences by gender and age with women and older people expressing more intention to take action, which again highlights the importance of differentiating messages for audience segments. They recommend that if communications are unable to be segmented by audience then motivational messages should be used. As regards age, older people feel less competent but hold

more intention to make behaviour changes, whereas younger people are more competent but need to have their intention to change enhanced by the message. The use of specific agentive language appears to also be effective in increasing people's sense of competence. One example they provide is: "A sentence like: ''I can shrink my contribution to global warming'' is agentic; it directly links the subject to the object, and potentially triggers moral thinking" (p.1306).

Hurlstone et al. (2014) stress the role played by normative messages in bolstering support for climate change policies. When policy preferences of others were communicated, this had a greater effect on garnering support for emissions cuts than providing information about Australia being one of the world's largest emitters. This suggests that presenting people with information about others' willingness to make policy changes is a more effective strategy than presenting negative facts. A second communication strategy that proved effective was that of framing the "costs of reducing emissions as a foregone-gain" rather than as a loss. This means using messages that explain that policy changes may only mean a "smaller increase in future income". Of note is that the research found that each method was equally effective at gaining support for policy changes but there was no benefit of combining the two approaches.

Values

A critical component to framing communications is using values that foster helpful attitudes and understandings, and engender support and action for solutions to that issue. The best way to do this is using intrinsic values. The Public Interest Research Centre (PIRC; 2011, p.20) describes these as "values that are inherently rewarding to pursue", such as connection with nature, concern for others and social justice. Conversely, extrinsic values focused on "external approval and rewards", such as wealth, material success and authority lead to less concern for things like environmental issues or human rights.

Simon et al. (2013) specifically examined how to use values to generate better understanding of environmental health work and found one effective value to use in framing communications. The *Fairness Between Places* value "cultivates population-level thinking about environmental health impacts and public responsibility for addressing those impacts" (p.14). This value opened up conversations and encouraged the audience to understand the importance of and need for collective responsibility and action for environmental health issues. Additionally, it contains what they term an "implicit call to action" that motivated people to support solutions to remedy inequity between communities' environmental health. It also discouraged zero-sum thinking so that the audience understood that providing resources to address environmental health in one place did not take away from other places.

Explanations/explanatory metaphors

Another critical part of the frame of strategic communications are explanatory metaphors. These are language devices that provide a recognisable and concrete comparison that explains a complex or complicated topic or issue (Frameworks, 2014). Of particular importance to the subject of environmental health is that explanatory metaphors will help the public to understand its effects on

human health and why it is important. Two key examples of these metaphors proven effective in Frameworks research are *"Ground Crew for Environmental Health and the Upstream Environments, Downstream Health"* (Bales & Lindland, 2014; Lindland et al., 2014). The Ground Crew metaphor, which compared environmental health work to that done by an airport ground crew, encouraged helpful thinking about:

- The importance of environmental health work.
- The multidisciplinary scope of environmental health work, and the breadth of skills and professions required to effectively promote environmental conditions for human health and prevent the unsafe conditions that would undermine it.
- Why environmental health work should be a public priority. (pp.5-6)

The Upstream/Downstream metaphor is:

> *We all live "downstream" from a range of environmental factors and conditions that affect our health. By ourselves, we can't control all the things that happen "upstream" in our environments. That is why we need people who specialize in working upstream to create positive environmental conditions for human health. These environmental health professionals understand how upstream factors have downstream effects, and can pay attention and intervene to ensure that what flows and cascades downstream is healthy and safe for all of us. (p.7)*

It fostered helpful thinking about:

- How environmental factors beyond the control of any individual actor affect health.
- The broad range of environmental factors that impact health.
- The importance of early intervention and prevention efforts, and the need for environmental health workers who are trained and specialized doing this proactive and preventative work. (p.7)

Storytellers/messengers

Previous work that The Workshop has has done on effectively communicating about climate change details that "the messengers selected to deliver climate communications will be more effective if the target audience recognises them as part of their own group, able to tap into the mental models people use to understand climate change, as well as qualified to comment" (The Workshop & Gray, 2019, p.7). Bales and Lindland (2014) make the case for a wider variety of messengers to speak on environmental health more broadly to make its importance and function clearer to the general public.

Linked to the earlier discussion of collaborations between researchers and communities, Jack et al. (2010) also found that collaborations between researchers and Indigenous communities "increase the likelihood of knowledge transfer and exchange" in environmental health research. Some of the factors that are key to the success of disseminating research findings are:
(1) crafting key messages
(2) locating credible messengers to deliver the messages
(3) identifying the communication channels commonly used to disseminate information.

They recommend limiting the use of scientific jargon and using plain language, communicating the key message in story form and if possible using Traditional Knowledge to help interpret research findings. Additionally, they warn against risk communications that might alarm the community. In terms of the messengers that should help deliver research findings, "cultural brokers, individuals who hold a personal understanding of Aboriginal beliefs, values and traditions of the community and have the knowledge and skills to interpret impact assessments or research findings" are best to use. Using multiple different communication methods is also effective.

This view is further supported by Boyd and Furgal (2019) who draw attention to the importance of effective risk communications about environmental health hazards with Indigenous populations. They detail crucial factors to consider (shown in Figure 6 below) including:

(1) developing messages that are congruent with the populations' cultural beliefs and understanding of the environment
(2) including Indigenous populations in message design and delivery
(3) using credible and trustworthy spokespeople in message delivery
(4) identifying and utilizing effective communication materials and channels
(5) ensuring that messages are understandable to the target audience. (Boyd & Frugal, 2019, p.1564)

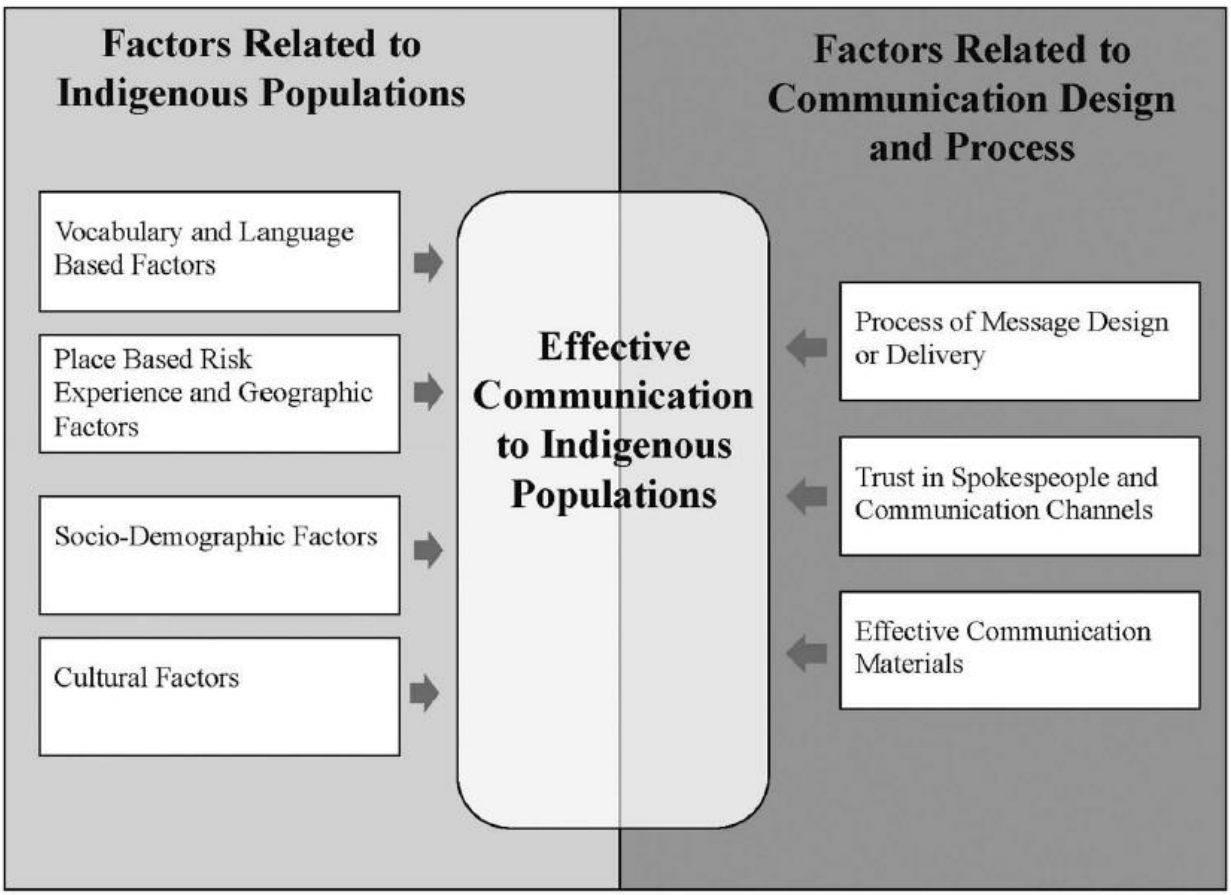

Figure 6: Summary of factors that affect effective communication of environmental health risks to Indigenous populations (Source: Boyd & Furgal, 2019, p.1570).

The need for Traditional Ecological Knowledge (TEK), "a subset of traditional knowledge maintained by Indigenous nations about the relationships between people and the natural environment", to be incorporated into environmental health research is reinforced by the work of Finn et al. (2017). Of particularly relevance to this review is the use of storytelling using indigenous language and images to communicate environmental health research findings to communities. This supports collaborations and provides for a culturally appropriate framework to foster active participation in addressing environmental health issues. They provide an example of the use of metaphors where a canoe trip is used to connect youth to cultural values as part of a youth suicide prevention intervention. Similarly, Hatala et al.'s (2020) recent study also identifies using Western methodology with Indigenous methodology as "two-eyed seeing". Culturally appropriate metaphors, such as seasonal change, helped to engage youth resilience. They caution that using collaborations like this in public health research needs to be done carefully and appropriately.

Miller et al. (2016) describe the use of "narrative approaches and storytelling...powerful health promotion tools that can spark interest, increase understanding of determinants of health, and translate complex science", where health professionals, rather than the general public, are the audience. An e-book was developed using a narrative approach with fictional stories to help teach the complexity of the interactions between environmental factors and health effects to health professionals with the aim to improve their environmental health literacy. They are then in a better position to talk to their patients and families about environmental health risks and encourage health promotion tools and policy actions.

The Frameworks Institute has put together all of the pieces to build effective narrative strategies to foster public understanding of environmental health issues such as air pollution as shown in Figure 7 below.

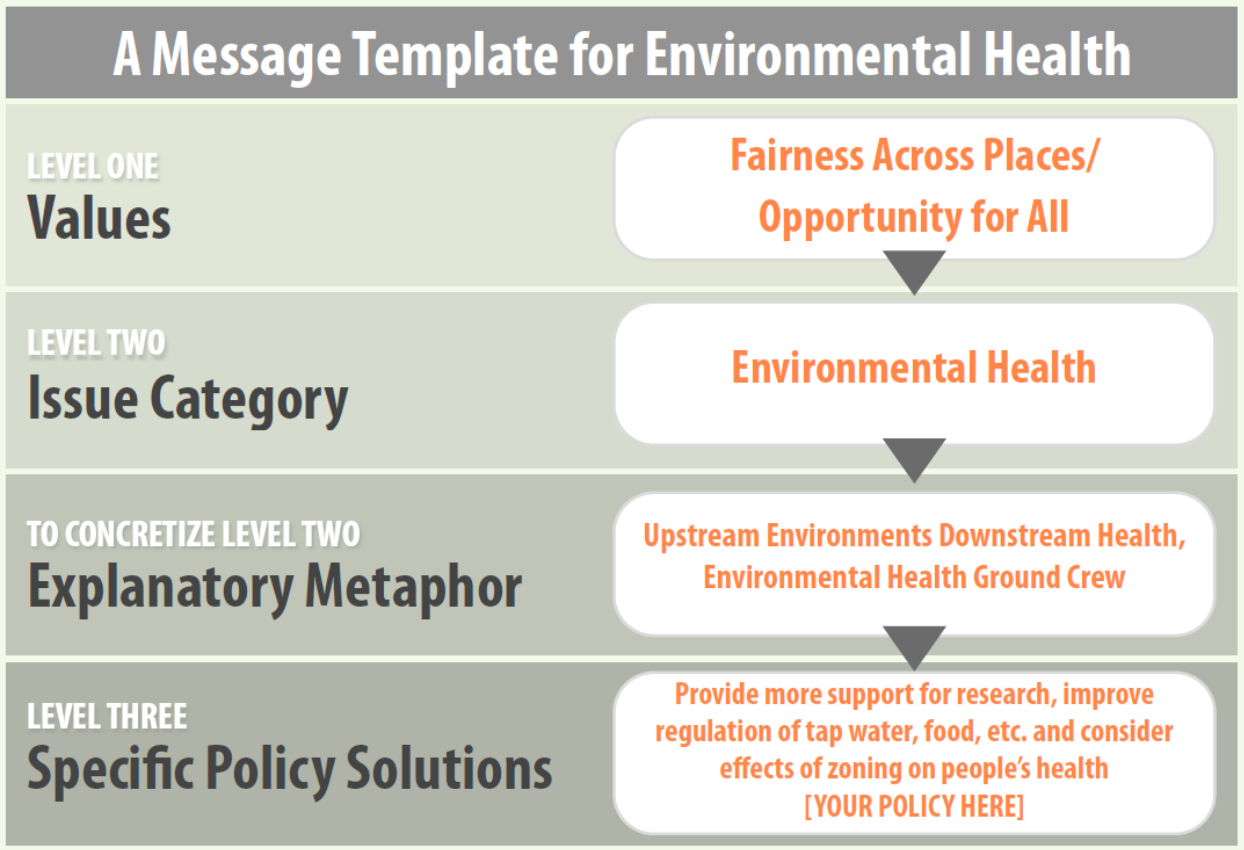

Figure 7: A FrameWorks message template for environmental health. (Source: Bales & Lindland, 2014, p.24).

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