X Encontro Brasileiro de Administração Pública.
ISSN: 2594-5688
secretaria@sbap.org.br
Sociedade Brasileira de Administração Pública

Use of the DPSSEEA framework as a tool for Public Communication of Environmental Health Surveillance policies and actions: selected indicators for strengthening participatory management

Boscolli Barbosa Pereira, Paloma Mansini Basso

[ARTIGO] GT 19 Gestão da Comunicação Pública

Use of the DPSSEEA framework as a tool for Public Communication of Environmental Health Surveillance policies and actions: selected indicators for strengthening participatory management

Abstract:
In this study, we conducted a critical review of the literature on the theoretical and methodological aspects involved in Public Communication actions of Environmental Health Surveillance policies and actions. We started from the conception that the Driving forces-Pressure-State-Exposure-Effect-Action (DPSEEA) framework, proposed by the World Health Organization, has the potential to consolidate a system of indicators that guides managers and citizens, integrating them in discussions and deliberation of public policies, aiming at achieving more participatory and qualified management in the health-environment interface. Our objective was to provide a critical framework of strategic Health and Environment indicators to foster public communication. We presented as results several possibilities of using selected indicators, which can favour the organization and synthesis of relevant information in the decision-making process.

Keywords: Sustainability, Planning, Ecosystem Services, Determinants.

Introduction

In the field of discussions that underlie decision-making processes related to Environmental Health, it is important to mediate the sharing of information. Thus, the reflections of theory (which articulate the themes of socio-economic development and production and consumption models with environmental and health issues) need to transit between managers and citizens, consolidating participatory management actions in the development of public policies for monitoring, protection, and prevention of the environment (HODGE; JUSTIN LONGO, 2002).

It is important that communication actions contribute to the planning and management of public policies that improve people's quality of life from a sustainability standpoint (LAM; LEFFLEY; COLE, 2014). To achieve greater and better functionality, it is not enough for Environmental Health Surveillance (EHS) to be committed only to some isolated exposure situations (soil, air, and water contaminated by pesticides,

asbestos, benzene, lead, and mercury) and effect (health hazards). It is necessary to have breadth and depth both in the contextual characterization of the environmental problem and in the operationalization of monitoring and management actions (protection, remediation, and prevention) of the risk factors involved (PEREIRA et al., 2017).

In urban, rural, or forested areas, 'environmental' factors are not always isolated but interact, constituting a complex mixture. Although many of the direct effects of an altered environment on human health seem well elucidated - as in the case of exposures to contaminated water, soil, and air - critical gaps remain regarding the cumulative and synergistic impacts of exposure to biological, physical, and chemical agents, such as pesticides, drugs, and radiation. In the same direction, we are still moving towards a better understanding of the nature and direct and indirect effects of climate change on ecosystems and health, frequent research topics in studies on vector proliferation, and outcomes such as heart attacks (BOYLAN et al., 2018).

In other words, decision-making processes related to Environmental Health must consider the concern to monitor the effects of environmental degradation but simultaneously understand and combat the causes and determinants that act as a driving force to produce exposure situations. It is, therefore, the objective of redefining strategies, mainly communication, for a better framing of problems, defining a set of integrated monitoring-protection-prevention-remediation actions for each one of them.

Thus, official, transparent, reliable, and representative databases can be consolidated for the collection and application of Environmental Health indicators. To do so, it is necessary that managers and other actors involved are committed, prepared, and equipped so that access to information fosters health promotion policies and practices (BÉDARD; WILLIAM, 2002).

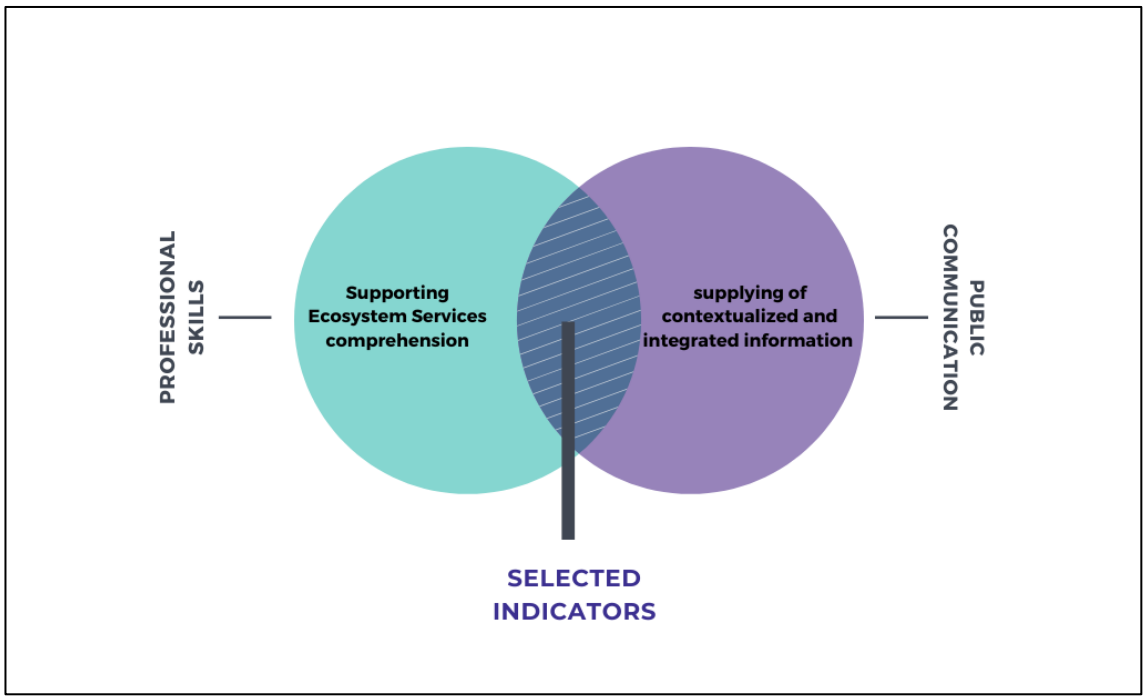
Here, our study aims to present and promote the discussion on the use of strategic Health and Environment indicators, organized in a hierarchical matrix, with the aim of favouring the organization and synthesis of relevant information in the dialogical and participatory process of decision-making.

Shared knowledge and participatory management in policies and actions in EHS

The development of a Public Communication model for Environmental Health Surveillance requires an interdisciplinary, intersectoral, and participatory approach. Therefore, the professionals responsible for mediating between managers and citizens

must appropriate the assumptions and principles of information and knowledge management. The expansion of the scope of competencies of Environmental Health Surveillance and the depth of its monitoring, protection, and prevention actions against environmental risk factors that interfere with health depend, to a large extent, on the restructuring of professional training and performance processes; communication practices, and use of strategic indicators (Figure 1).

Figure 1. Relevant aspects for the reorientation of Public Communication in EHS.



Authors (2023).

However, the challenge of interdisciplinarity and articulation with multiple institutions, organizations, and instances of the public and civil society involves the need to restructure surveillance actions (epidemiological, sanitary, environmental, and occupational health) in health departments (municipal and state), as well as in the Ministry of Health.

More specifically, regarding organizational planning for the performance of Environmental Health Surveillance in municipalities, not only the disarticulation with other surveillances has been observed (although they may share the same physical structure), but there is a clear lack of standardization in the methodologies adopted for the survey and analysis of Environmental Health indicators (PEREIRA; LIMONGI, 2015),

which may roughly represent that there is no knowledge about what should be done or what is expected from the actions.

With the aim of executing a Structuring Project for the National Health Surveillance System, in 2005, the Ministry of Health, based on the Normative Instruction 01/2005, defined eight areas of operational performance of EHS, representing specific action programs: Quality of Water for Human Consumption; Air Quality; Soil Quality; Health Surveillance of People Exposed to Chemical Contaminants; Environmental Health Surveillance Related to Natural Disasters; Environmental Health Surveillance Related to Accidents with Dangerous Products; Environmental Health Surveillance Related to Physical Factors and Surveillance in Occupational Health.

Even after several years, it is still possible to affirm that Environmental Health Surveillance is far from being consolidated, both as a concept and through systematized monitoring actions of determinants and indicators that consider the municipality with greater emphasis on the protection and prevention of risks produced by human interaction with the environment. And a path to this consolidation is in the health pact, where the insertion of models of public communication in primary care should be understood as an improvement of the model of public health management in the municipality, especially when it allows integrating health teams (environmental, epidemiological, sanitary, and occupational).

Thus, models of Public Communication based on participatory management represent an effective way to overcome the current reactive model - which only transfers responsibility and blame to citizens - because the nature and intensity of changes at the ecosystem level require prognostic capacity and preventive action efficiently. In other words, these communication activities can consolidate and favour the planning, implementation, and evaluation of Environmental Health policies and actions within the scope of Public Administration.

Using the DPSEEA framework to support public communication and decision making

Health and environmental indicators have always been part of the instruments for diagnosis and risk analysis in the field of Environmental Health (CAMARA; TAMBELLINI, 2003), but understanding the complex relationships - historically constructed and mediated by social, economic, and cultural factors - that generate the

environmental risk factors addressed by EHS results from the selection and integrated analysis of strategic indicators.

The World Health Organization recognizes the potential strategic use of selected indicators to contextualize and synthesize information on Environmental Health (Corvalán; Briggs; Kjellström, 1996). Therefore, as highlighted in Table 1, it is important that the indicators have broad application, are directed at Environmental Health problems, are consolidated, and can be monitored.

In this sense, as previously argued in a previous work (PEREIRA, 2020), two possibilities are available to EHS: to create and consolidate its own model of information and knowledge management, considering the weakened notification network hierarchized in the administrative structures of municipal and state health secretariats; or to adopt and adapt an already structured model, contributing to the organization of indicator matrices that can guide actions and decision-making in the field of public health, with the definition of evaluation, prevention or management measures for situations of environmental risk and adverse effects on the health of the population.

In the case of adopting a structured reference model, WHO proposes using the Driving forces-Pressure-State-Exposure-Effect-Action (DPSEEA) framework to organize matrices of Environmental Health indicators (Figure 2). This model has been the subject of discussion and partial implementation within the scope of EHS (ARAÚJO-PINTO; PERES; MOREIRA, 2012; STEDILE et al., 2018). In Table 1, we list 200 indicators used in the DPSEEA framework.

The DPSEEA framework (Driving forces-Pressure-State-Exposure-Effect-Action) is a comprehensive tool used to assess the environmental impact of human activities. The framework consists of six axes that represent different determinants of the environmental impact assessment process. In Table 1, we list 200 indicators used in the DPSEEA frameworks.

These indicators form a cyclical model that allows a comprehensive assessment of the environmental impact of human activities. By analyzing the relationships between these indicators, researchers and policy makers can identify the drivers of environmental degradation, assess the risks and impacts of different activities, and develop strategies to mitigate these impacts and promote sustainable development.

Table 1. Selected indicators of the DPSEEA framework.

Axis	Indicators
Driving Forces	Population growth rate Urbanization rate Economic growth rate Consumption patterns Technological development Energy consumption Land use change Policy and regulatory frameworks Social and cultural factors International trade and globalization Human development index Energy intensity Material consumption Water use Forest cover change Transport activity Agricultural production Economic inequality Access to education Political stability Corruption index
Pressure	Air pollution Water pollution Soil contamination Deforestation Habitat destruction Climate change Ocean acidification Eutrophication Waste generation Chemical contamination Land degradation Soil erosion Overfishing Habitat fragmentation Invasive species Noise pollution Light pollution Radioactive contamination Groundwater depletion Acid deposition

State	Air quality Water quality Soil quality Biodiversity Habitat quality Climate conditions Forest cover Wetland area Marine ecosystems Human health Greenhouse gas emissions Carbon footprint Nitrogen deposition Ozone depletion Toxicity of chemicals Water availability Groundwater recharge Ecological footprint Soil organic matter Food security Environmental stressors
Exposure	Ambient air pollution Waterborne diseases Food contamination Exposure to hazardous chemicals Occupational exposure Noise pollution Exposure to radiation Extreme weather events Natural disasters Vector-borne diseases Heat waves UV radiation exposure Water scarcity Chemical spills Airborne diseases Climate-related diseases Water-related diseases Food-borne diseases Soil-borne diseases Biological agents
Effects	Respiratory diseases Cardiovascular diseases Cancer Birth defects

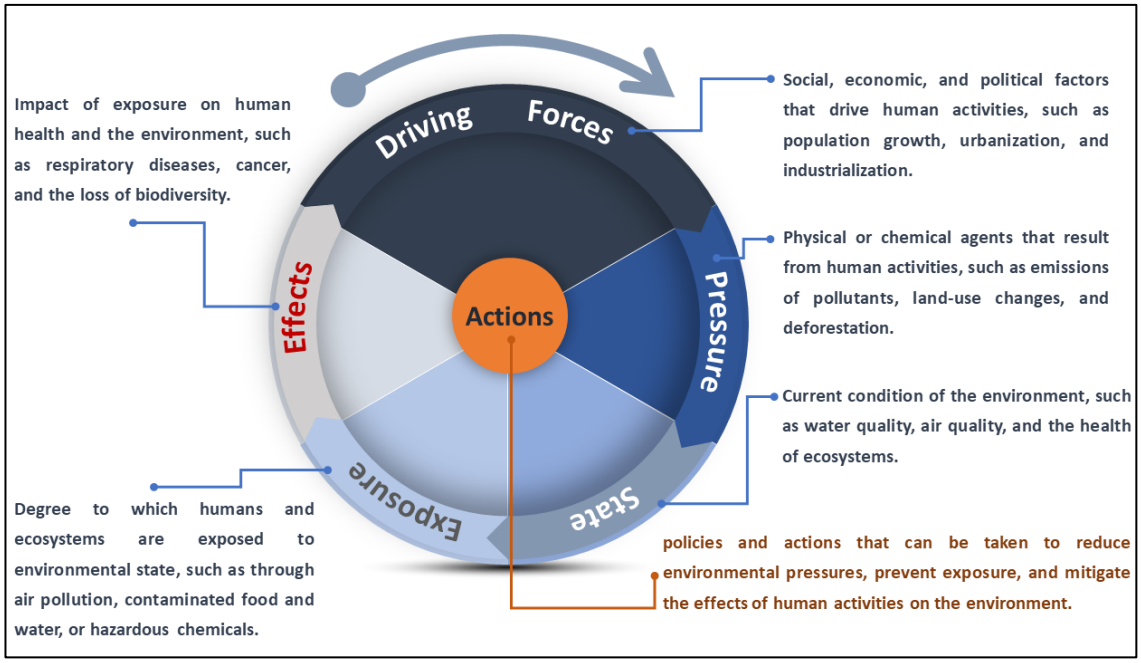
	Neurological disorders Reproductive disorders Behavioural and cognitive disorders Loss of biodiversity Ecosystem disruption Climate change impacts Waterborne diseases Food-borne diseases Vector-borne diseases Mental health disorders Heat stress Skin cancer Eye diseases Malnutrition Poisoning
Actions	Environmental policies and regulations Resource management strategies Pollution prevention measures Environmental education and awareness Sustainability certification programs Climate change mitigation and adaptation measures Environmental impact assessments Sustainable land use planning Conservation and restoration programs Waste management and recycling programs Green technologies Carbon pricing Renewable energy deployment Sustainable transportation Circular economy initiatives Sustainable agriculture practices Forest conservation Ecosystem restoration Biodiversity conservation Public health interventions Disaster preparedness plans

Source: Authors (2023).

As we demonstrate in Figures 1 and 2, the use of the DPSEEA framework is beneficial both for organizing risk management teams and for public communication. The clear connection between the indicators and determinant axes, interconnected in a hierarchical chain of causality, promotes the understanding that population health conditions are not only the result of exposure to environmental risk factors, but of a

broader context, directly influenced by production and consumption patterns imposed by the economic model, which alter ecosystems (EDOKPOLO et al., 2019).

Figure 2. Using the DPSEEA framework for EHS.



Authors (2023).

Concluding remarks

As already advocated, it is essential that EHS also operates in the field of public communication, especially by informing about the impacts of the predominant model of human life and consumption on ecosystems, such as in cases of indiscriminate use of antibiotics and contraceptives that modify the natural environment, altering the bidirectional relationship between health and environment (GRAY; LE MONOSSON; KELCE, 1996). For example, in the case of the impacts (and increase) of wildfires (urban, rural, or forest), it is important that the concern "about the effects on human health" be redirected to "the effects on ecosystems", of which we are part and depend on (main determinant) for survival.

However, the success of using the DPSEEA framework depends on the shared use of the proposal among the EHS teams but also on obtaining qualified indicators that go beyond the exposure-effect axis. It should be clarified that monitoring and controlling the impacts of production modes on ecosystems are not EHS's responsibilities, although this

is often considered. In fact, EHS relies on indicators resulting from these actions to act, but it is not its responsibility to produce them.

EHS's work proposal based on a systemic view of the relationship between health and the environment should make more sense for citizens, managers, researchers, and professionals working in the area. Certainly, promoting recognition of the importance of considering the conditions of the "entire", complex, and integrated environment will bring greater engagement and meaning to EHS.

In a context of wide political, economic and social inequality, the traditional model of Public Communication - centralized and vertical - avoids the inclusion of civil society in reflections, as well as in actions and, above all, in the essential feeling of participation in the system as a social actor in the construction of ethical-political guidelines. Thus, one of the most important challenges of participatory management consists precisely in transcending the verticality of communicative models, allowing for the sharing of knowledge and interests among institutions, communities, and individuals.

References

ARAÚJO-PINTO, M. D.; PERES, F.; MOREIRA, J. C. Using the 'Driving Force - Pressure - State - Exposure - Effects - Action' (DPSEEA) model of the World Health Organization (WHO) for the analysis of risks related to the use of pesticides in agricultural activities in the state of Rio de Janeiro. **Ciencia & Saúde Coletiva**, v.17, n.6, p.1543–1555. 2012. doi: https://doi.org/10.1590/s1413-81232012000600018

BÉDARD, Y.; WILLIAM, D. H. Modern information technologies in environmental health surveillance. An overview and analysis. **Canadian Journal of Public Health**, v.93 Suppl 1, S.29-33. 2002. doi: https://doi.org/10.1007/BF03405115

BOYLAN, S.; BEYER, K.; SCHLOSBERG, D.; MORTIMER, A.; HIME, N.; SCALLEY, B.; ALDERS, R.; CORVALAN, C.; CAPON, A. A conceptual framework for climate change, health and wellbeing in NSW, Australia. **Public Health Research & Practice**, v.28, n.4, p.2841826. 2018. doi: https://doi.org/10.17061/phrp2841826

CORVALÁN, C.; BRIGGS, D.; KJELLSTRÖM, T. **Development of environmental health indicators**. In Linkage methods for environment and health analysis. In BRIGGS D, CORVALÁN C, NURMINEM M. (Ed.), Geneva: Office of Global and Integrated Environmental Health. Geneva: World Health Organization. p. 19-53. 1996.

EDOKPOLO, B.; ALLAZ-BARNETT, N.; IRWIN, C.; ISSA, J.; CURTIS, P.; GREEN, B.; HANIGAN, I.; DENNEKAMP, M. Developing a Conceptual Framework for Environmental Health Tracking in Victoria, Australia. **International Journal of Environmental Research and Public Health**, v.16, n.10, p.1748. 2019. doi: https://doi.org/10.3390/ijerph16101748

HODGE, R. A.; JUSTIN LONGO, J.M. International monitoring for environmental health surveillance. **Canadian Journal of Public Health**, v. 93 Suppl, S16-23. 2002. doi: https://doi.org/10.1007/BF03405113

GRAY; J.R.; LE MONOSSON, E.; KELCE, W.R. **Interconnections Between Human and Ecosystem Health** (Anonymous 1 edition). London: Chapman & Hall. p.46-84. 1996.

LAM, S.; LEFFLEY, A.; COLE, D. C. Applying an Ecohealth perspective in a state of the environment report: experiences of a local public health unit in Canada. **International Journal of Environmental Research and Public Health**, v.12, n.1, p. 16–31. 2014. doi: https://doi.org/10.3390/ijerph120100016

PEREIRA, B.B. Gestão da informação e do conhecimento nas práticas de Vigilância em Saúde Ambiental: caminhos para alcançar amplitude e profundidade nas ações de monitoramento, proteção e prevenção. In: LIMONGI, J.E (Org.). Vigilância em Saúde: Interfaces entre a Saúde Pública e a Pesquisa Científica. 1Ed. Uberlândia: Editora Colab, 2021, Cap.1, p. 8-16. doi: http://dx.doi.org/10.51781/9786586920185816

PEREIRA, B. B.; DA CUNHA, P. B.; SILVA, G. G.; DE CAMPOS JÚNIOR, E. O.; MORELLI, S.; FILHO, C. A.; DE LIMA, E. A.; BARROZO, M. A. Integrated monitoring for environmental health impact assessment related to the genotoxic effects of vehicular pollution in Uberlândia, Brazil. **Environmental Science and Pollution Research International**, v.24, n.3, p. 2572–2577. 2017. doi: https://doi.org/10.1007/s11356-016-8039-5

STEDILE, N.; SCHNEIDER, V. E.; NUNES, M. W.; KAPPES, A. C. Application of the DPSEEA Model to Healthcare Waste Management. **Ciencia & Saúde Coletiva**, v.23, n.11, p.3683–3694. 2018. doi: https://doi.org/10.1590/1413-812320182311.19352016