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Authors

Valentine, Sarah

Jacelon, Cynthia

Cavanagh, Stephen

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NYS Nonprofit Hospital Assessment and Response to Environmental Pollution as Community Health Need: Prevalence in Community Benefit Practices

Sarah K. Valentine, PhD, RN; Cynthia S. Jacelon, PhD, RN; Stephen J. Cavanagh, PhD, RN

ABSTRACT

Context: Given the impact of environmental pollution on health and health inequity, there may be substantial value in integrating assessment and response to pollution into nonprofit hospital community benefit processes. Such hospital engagement has not yet been studied.

Objectives: We take a preliminary step of inquiry in investigating if nonprofit hospitals in New York State (NYS) assess, identify, or respond to environmental pollution as part of community benefit processes.

Design: This study is of retrospective, observational design. Data were abstracted from community health needs reports (2015-2017), associated implementation plans, and related IRS (Internal Revenue Service) filings from a randomly geographically stratified selection of NYS nonprofit hospitals.

Participants: The sample includes 53 hospitals from 23 counties. The sampling frame consists of NYS nonspecialty private nonprofit hospitals.

Main Outcome Measures: Dichotomous findings for the following: (1) engagement of environmental pollution in the process of assessment of community health needs; (2) environmental pollution concern identified as a priority community health need; (3) strategic planning present to address pollution identified as community health need; and (4) action taken on same.

Results: We found that 60.5% (95% confidence interval [CI], 0.46-0.74) of hospitals evidenced some form of assessment of environmental pollution and 18.9% (95% CI, 0.09-0.32) identified pollution as a priority community health need. However, no hospital went on to take independent or collaborative planning or action to address pollution. In additional analysis, we found that social justice in hospital mission was a positive predictor of assessment of environmental pollution.

Conclusions: For NYS hospitals, we found a substantial presence of assessment and identification of pollution as a community health concern. Our finding of the absence of response to environmental pollution represents a gap in community benefit implementation. This indicates a yet untaken opportunity to address racial and economic environmental health injustices and to improve population health.

KEY WORDS: community benefit, environmental health, environmental pollution, health equity, population health

Author Affiliations: School of Nursing and Allied Health, SUNY Empire State University, Saratoga Springs, New York (Dr Valentine); Elaine Marieb College of Nursing, University of Massachusetts Amherst, Amherst, Massachusetts (Dr Jacelon); and Betty Irene Moore School of Nursing, University of California, Davis, Davis, California (Dr Cavanagh).

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Environmental pollution is a substantial determinant in the health of populations and has a negative and disproportionate effect on people of color and economically disadvantaged persons. Therefore, to maximize their contribution to improvement of population health, hospitals should assess local health impacts of environmental pollution and fully consider the utility and feasibility of joining in collective action to address such concerns.

Correspondence: Sarah K. Valentine, PhD, RN, School of Nursing and Allied Health, SUNY Empire State University, 113 West Ave, Saratoga Springs, NY 12866 (sarah.valentine@Suny.Empire.edu; svalentine@tutanota.com).

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Community benefit policy and processes are an important pathway by which nonprofit hospitals assess and respond to community health needs. The Patient Protection and Affordable Care Act of 2010 strengthened requirements for hospital community benefit that have been translated to specific Internal Revenue Service (IRS) regulations.¹ The final regulatory rules require that nonprofit hospitals complete, and publicly report, a triennial community health needs assessment (CHNA), with prioritized community health needs. Hospitals are to develop an implementation plan to respond to these needs and subsequently report relevant activities to address those needs (or provide rationale for not addressing).¹

All private hospitals in New York State (NYS) are nonprofit and therefore receive tax exemptions and are required to follow federal community benefit regulations. There are also analogous NYS regulations for community benefit,² which include triennial community service plans. Some hospital efforts may overlap in satisfying both federal and state community benefit requirements.

Recommendations and models have been introduced to advance the ability of hospital systems to improve population health through both population health management, via direct patient care, and community health improvement, via work to address determinants of health at a community level.^{3–9} Hospitals show a modest but growing commitment to a normative idea of improving health and health equity by addressing social and environmental determinants of health.^{4,10–14} Community benefit has been held up as an important means of doing so.^{15–17} Hospitals in the United States dedicate only a small portion of hospital spending to community health improvement services and community-building activities¹⁸ (which may address social and environmental health determinants). Yet, community-directed community benefit spending has been associated with reduced Medicare hospital readmission,¹⁸ an important quality and fiscal benchmark. Although some nonprofit hospitals address social and environmental determinants of health within community benefit processes,^{19,20} we do not know the extent to which nonprofit hospitals assess and respond to environmental pollution within the communities they serve.

Hospital culture and orientation may affect institutional disposition to engage concerns of environmental pollution. A population health approach in which determinants of health are addressed within a geographic community and evaluation of such efforts is done on a community scale¹³ may support such engagement. Institutional commitment to social justice may also influence engagement as the distribution of pollution-related health impact is disproportionate by

identified race and economic status. In addition, institutional consciousness of stewardship for the health of the planet may have bearing on such engagement.

Significance

The global impact of environmental pollution on health is massive, with 9 million deaths annually (or 1 in 6 deaths) attributable to pollution exposure.²¹ Although the impact of pollution in the United States is less than that in lower-income nations,²¹ US residents still experience substantial health consequences from pollution. Disparities by race and income are also prominent for both pollution exposure and exposure-related health outcomes.^{22–26} Children are particularly susceptible to the impact of environmental pollution, which may be related to higher metabolism in childhood with a greater effect of toxins, as well as to temporal windows of increased developmental vulnerability to toxins.^{27,28}

Data from the World Health Organization²⁹ published in 2016 shows that 11% of deaths in the United States are attributable to the environment and that this mortality is primarily from noncommunicable disease. Environment here was conceptualized as a broad category in which environmental pollutants are included.

Environmental pollution exposure is associated with neurologic, endocrine, reproductive, immunologic, respiratory, cardiac, and other morbidity, as well as with premature mortality. The scientific literature on adverse health outcomes related to pollution exposure is broad and extensive. Findings include compromised cognitive function and concerns with attention and hyperactivity disorders associated with exposure to polychlorinated biphenyls, organophosphate insecticides, brominated flame-retardant, and air pollution (including fine particulate matter [PM] 2.5).^{21,30–33} Exposure to elevated ozone and PM_{2.5} is associated with preterm birth and low birth weight.²⁵ A range of air pollutants have been associated with indicators of decreased male fertility.³⁴ Perfluoroalkyl substances (PFAS) exposure has been associated with decreased vaccine antibody response³⁵ and increased severity of infectious disease outcomes.³⁶ Both PFAS and elements of air pollution are associated with increased severity of COVID-19.^{37–40} In the United States, as assessed before the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, air pollution (specifically fine PM_{2.5} and ozone) is linked to substantial all-cause mortality even at levels below that of current Environmental Protection Agency–designated safe standards, and when controlling for potential confounding variables.^{24,26,41} The distribution of health impacts of air pollution is inequitable.

Research findings indicate that Black, Hispanic, and Asian persons, men, and persons with low economic status are at greater risk of death attributable to air pollution exposure.^{24,26} Alarmingly, one study found that the percentage point increase in health risk associated with a 10 $\mu\text{g}/\text{m}^3$ increase in PM exposure is 3 times greater for Blacks as compared with the general population (hazard ratio of 1.21 as compared with 1.07).²⁴

Given the substantial impact of environmental pollution on health outcomes, it is important to know if environmental pollution is addressed at the community level by nonprofit hospitals, which are expected to recognize and respond to community health needs. Such knowledge will facilitate discernment of hospital engagement with environmental pollution as a practice and policy problem and may support advancing this matter on research and health policy agendas. An exploration of the relationship of hospital mission to engagement with pollution may contribute to greater appreciation of factors that support hospitals' work to address this important determinant of health.

Methods

Using a retrospective, observational design, we studied the community benefit practices of NYS hospitals as related to environmental pollution and community health. We asked: Do nonprofit hospitals in NYS assess, identify, or respond to environmental pollution as part of community benefit processes? This question was asked within the context of community benefit processes and as indicated in selected community benefit-related documents. In addition, we asked, is there a relationship between specified elements of hospital mission and the primary phenomena of interest?

Sample

We took a cross-sectional sample of NYS hospitals by randomly selecting counties and including all eligible hospitals in each county until we reached a total of 53 hospitals. We determined the desired sample size by an a priori power analysis to support anticipated logistic regression analysis. We used probability sampling at the county level to support generalizability of findings within NYS. We used an a priori forced inclusion of one New York City county, randomly drawn from a subset. We limited the sample to NYS hospitals to reduce variability of state-level contextual factors. The sampling frame for this study, with geographical stratification, was constituted of private, nonspecialty nonprofit hospitals in NYS.

Hospitals were eligible if subject to federal requirements to participate in community benefit (501 C

status and nongovernment entity). Government-owned public and military hospitals were not included because of exemptions from community benefit IRS reporting requirements. Because of their small number in NYS, children's hospitals were not included in order to support consistency of the sample. Specialty hospitals were likewise not included.

The exclusion criteria were either no publicly available CHNA documentation or IRS Form 990 from the time frame of interest. We considered hospitals to have a CHNA if such was claimed by the hospital and if the CHNA served as the working document for community benefit processes. This was the case even if the report was coauthored or primarily authored by another source such as a local health department, or if having shared functionality for a department of health as a community health assessment (CHA) or with other hospitals in the region as the guiding CHNA.

Approach to data

Sources of data included CHNA reports, associated community service implementation plans or community service plan, and IRS Form 990 Schedule H.⁴² We drew hospital mission statements from hospital Web sites, CHNA reports, and/or IRS Form 990.

We coded data from qualitative sources (primary documents and Web sites) for dichotomous (present/not present) variables for quantitative analysis based on a priori concepts of phenomena. We gathered data using a document analysis approach, with concept content analysis to discern the existence of specific phenomena related to our research questions. One researcher served as the instrument of discernment, proceeding with criteria that were found by 2 other researchers to be acceptable and that provided consistency and stability in data gathering. The process involved intensive line-by-line reading of the documents, so brought a closeness with the sources that supported sensitivity to discerning the phenomena of interest. The criteria, serving as decision rules for a priori codes, supported stability and consistency in collection. These criteria are explicated in our description of variables and in Table 1.

For each hospital, we maintained a record of how the criteria for each variable were met (if a positive finding) and the location of this evidence. When ambiguities arose in the coding process, we tracked the rationales for how to proceed on a decision rule audit, which then served as a reference and precedent for subsequent dilemmas. Although we used techniques associated with qualitative analysis when collecting data, we used only quantitative approaches in analysis.

TABLE 1
Community Benefit Engagement of Environmental Pollution Variables Descriptions^{a,b}

| Dichotomous Variables | Positive Finding Criteria | Source for Data |
|---|---|--|
| Assess Environmental Pollution | Hospital CHNA report assessment approach planned for or resulted in inclusion of quantitative or qualitative environmental pollution data. | CHNA report. |
| Identify Pollution as Community Health Need | Environmental pollution concern identified as a significant community health need in the hospital CHNA report or associated IRS reporting. | CHNA report and subsequent year's IRS Form 990 Schedule H, Part V, Section B/C, item 11. ^c |
| Plan to Address Environmental Pollution | Strategic planning to address ^d environmental pollution as a community health need described in the CHNA report, implementation plan, or associated IRS reporting. | CHNA report and implementation or service plan. Also, the subsequent year's IRS Form 990 Schedule H, Part V, Section B/C, item 11. |
| Action Taken on Environmental Pollution | IRS reporting revealed actions taken by the hospital to reduce community-level pollution or limit exposure to pollutants. | IRS Form 990 Schedule H, Part V, Section B/C, item 11 ^c and Part II, item 4. ^e |

Abbreviations: CHNA, community health needs assessment; IRS, Internal Revenue Service.

^aThe authors' own conceptualization, 2017 IRS Form 990 Schedule H⁴² and Final Rules on Community Health Needs assessments for charitable hospitals.¹

^bThe IRS forms utilized were from the year subsequent to the CHNA report reviewed.

^cIRS Form 990 Schedule H, Part V, section B/C, item 11: This section states "Describe in Section C how the hospital facility is addressing the significant needs identified in its most recently conducted CHNA and any such needs that are not being addressed."

^dPlan to address pollution or impact at a primary or secondary prevention level.

^eIRS Form 990 Schedule H, Part II, Community-Building Activities, item 4 "Environmental Improvements" (eg, water or air pollution).

Variables

To investigate the primary research question, we conceptualized 4 sequential phases of community benefit processes at which a hospital may engage with environmental pollution. These variables are named as follows: variable I, Assess Environmental Pollution; variable II, Identify Pollution as Community Health Need; variable III, Plan to Address Environmental Pollution; and variable IV, Action Taken on Environmental Pollution. In this study, we defined environmental pollution as pollution that is encountered via outdoor air, water, or soil.

We drew data from the hospital community benefit-associated triennial CHNA report from within the years 2015-2017 for variables I, II, and III; existing CHNA-associated implementation plan (or community service plan if serving function of implementation plan) for variable III; and from IRS Form 990 Schedule H⁴² from the year subsequent to the CHNA for variables II, III, and IV. Further details regarding data sources are provided in Table 1.^{1,42}

Criteria for variable I, Assess Environmental Pollution, were either preestablished CHNA strategies to assess environmental pollution or inclusion of quantitative or qualitative environmental pollution data in the CHNA. We applied this broadly and gave a positive "Assess" coding if there was an assessment of environmental pollution described in the CHNA

methods section, if quantitative data on local environmental pollution were presented in the CHNA, or if there was a qualitative expression of a local environmental pollution concern (such as from a community survey or community meeting).

Variable II, Identify Pollution as Community Health Need, was interpreted with the criteria that environmental pollution was designated as a priority community health need in the CHNA or IRS reporting (see Table 1 for specific elements of IRS document). A list of priority needs is normally part of the CHNA report and should be included in associated IRS reporting.

Criteria for variable III, Plan to Address Environmental Pollution, were indication in the CHNA report, implementation/service plan, or associated IRS reporting of strategic planning to address environmental pollution as a community health need. The plan must have been at the primary or secondary prevention level. Treatment of ongoing disease resulting from or exacerbated by pollution would not be coded as a positive finding here. Planned action could be institutional, collaborative, or supportive (eg, funding).

For variable IV, Action Taken on Environmental Pollution, the criterion was applied only to the tax reporting of the subsequent year as this document reports actions taken since the last CHNA. The criterion was indication of actions taken by the hospital to reduce community-level pollution or limit exposure to

TABLE 2
Hospital Mission Variables Descriptions^{a,b}

| Dichotomous Variables | Positive Finding Criteria | Source for Data |
|--|---|--------------------------------------|
| Community Commitment in Mission | Statement of service or commitment to community as value | Hospital mission or values statement |
| Social Justice in Mission | Statement of service or commitment to justice, the underserved, poor, or vulnerable | Hospital mission or values statement |
| Determinants of Health Approach in Mission | Statement of concern with or commitment to addressing determinants of health, upstream health factors, or population health | Hospital mission or values statement |
| Natural World Commitment in Mission | Statement of commitment to stewardship or care for the natural environment, natural resources, or the earth | Hospital mission or values statement |

Abbreviation: IRS, Internal Revenue Service.

^aHospital-specific community health needs assessments from 2015 to 2017, IRS Form 990 from subsequent year. Hospital Web sites from the year 2020.

^bWe utilized all sources in which the mission or values were stated and coded positive findings if present in at least one source.

pollutants. See Table 1 for specific elements of the tax documentation.

To investigate for relationships between elements of the hospital missions and the primary phenomena of interest, we examined 4 potential aspects of mission and values. We drew hospital mission and values statements from the selected CHNA, subsequent year IRS Form 990, and hospital Web sites from the year 2020 (all of these in which the mission or values were stated) and analyzed, in the approach previously described, for content related to elements of mission (Table 2).

We operationalized the variable “Community Commitment in Mission” as a statement of service or commitment to community as value. We did not code this as positive if there was only a stated commitment of providing clinical direct care to the community. We did code as positive if there was a statement of meeting the health care needs or improving the health of the community. We operationalized the variable “Social Justice in Mission” as a statement of service or commitment to justice, the underserved, poor, or vulnerable. We operationalized the variable “Determinants of Health Approach in Mission” as a statement of concern with or commitment to addressing determinants of health, upstream health factors, or population health. Finally, we operationalized the variable “Natural World Commitment in Mission” as a statement of commitment to stewardship or care for the natural environment, natural resources, or the earth.

Plan for analysis

To quantify the extent to which NYS hospitals engage environmental pollutants as part of efforts to identify and address community health needs, we used relative frequencies to discern prevalence. We generated confidence intervals (CIs) to support inference of

these findings from the study sample to the population (NYS private nonspecialty nonprofit hospitals).

We used multiple logistic regression to assess existence and magnitude of relationship between elements of hospital mission, with the variables that operationalize community benefit processes and engagement of environmental pollution. We based the logistic regression model on theoretically related hospital mission variables that had at least one positive finding. Likewise, we only tested the dependent variables found to have at least one positive finding.

Results

The sample included 53 hospitals drawn from a total of 23 counties. The 53 hospitals in the sample represent 32% of all NYS private nonprofit hospitals. The 23 counties sampled comprise 37% of all NYS counties. Six hospitals were excluded from the sample based on the exclusion criteria of lack of publicly accessible CHNA or IRS Form 990. Five of the excluded hospitals were in a metropolitan area.

Overall, 17 of the included counties, 47 hospitals from the sample, are designated as belonging to an NYS metropolitan statistical area region, that is, nearby to city of at least 50 000 persons or more or county population greater than 100 000 persons.⁴³ Of these metropolitan hospitals, 14 are from New York City counties. Five of the included counties, 6 hospitals in the sample, are designated as rural or belonging to micropolitan regions. One of the most significant pollutants affecting health, airborne fine (PM_{2.5}), ranged, at a county level, from 6.6 to 11 $\mu\text{g}/\text{m}^3$ in 2014⁴⁴ for the hospitals in the sample.

The results of our primary inquiry on whether nonprofit hospitals in NYS assess, identify, or respond to environmental pollutants as part of community

TABLE 3
Outcomes Relevant to Primary Research Questions^{a,b}

| Dichotomous Variables | Percent Positive Finding |
|---|---------------------------|
| Assess Environmental Pollution | 60.4% (95% CI, 0.46-0.74) |
| Identify Pollution as Community Health Need | 18.9% (95% CI, 0.09-0.32) |
| Plan to Address Environmental Pollution | 0 |
| Action Taken on Environmental Pollution | 0 |

Abbreviations: CI, confidence interval; IRS, Internal Revenue Service.

^aThe authors' own analysis of hospital-specific community benefit reporting (IRS Form 990: Schedule H,⁴² hospital community health needs assessment and implementation reports).

^bAlthough 2 hospitals wrote of secondhand smoke in terms of air quality, this was not substantiated as an outdoor air quality concern; therefore, the subsequent hospital actions on smoking cessation were not coded as present findings for variables III and IV.

benefit processes show that 60.4% (95% CI, 0.46-0.74) of hospitals, 32 of 53 total, engaged in some assessment of environmental pollution as a potential community health need. Of the sample, 18.9% (95% CI, 0.09-0.32) of hospitals, 10 of 53 total (or 31.25% of those hospitals that assessed for environmental pollution) identified pollution as a priority community health need. No hospital, as indicated in community benefit documentation, went on to plan or take action on environmental pollution (Table 3).

Social Justice in Mission emerged as a very strong predictor of Assessment of Environmental Pollution, ($W[1] = 4.21, P = .04$, odds ratio [OR] = 10.4), when in the small model of 2 mission variables with Community Commitment. Hospitals had more than 10 times greater odds of having some assessment for environmental pollution if social justice or commitment to the poor or underserved was part of the hospital mission. Social Justice Mission was not significant in the same model for Identification of Environmental Pollution. Community Commitment in Mission was not a significant predictor independently but the model including both Community Commitment and Social Justice was significant in relationship to Assessment of Environmental Pollution. The other 2 variables pertaining to hospital mission, Determinants of Health Approach in Mission, and Natural World Commitment in Mission, were not included in models as there were no positive findings for these variables. Likewise, the relationship to the variables Plan to Address Environmental Pollution and Actions Taken on Environmental Pollution were not explored as there were no positive findings for these variables. See Supplemental Digital Content Table 1 (available at <http://links.lww.com/JPHMP/B201>) for logistic regression results.

Discussion

Limitations

The cross-sectional nature of the design used a particular round of community benefit reporting. There are likely to be changes in context and practices that occur subsequent to this (2015-2018) time frame. This study establishes an initial step of inquiry that should continue to be built upon both to detect changes in practice over time and to broaden related questions and approaches to inquiry.

The specificity of the sampling frame limits considerations of generalizability to NYS nonprofit private nonspecialty hospitals. Although accomplished with probability sampling, the geographical stratification of the sample has the potential to introduce geographical or other selection bias. Without the inclusion of public hospitals, there may be phenomena related to interhospital sharing or shunting of environmental pollution-related actions that would not be captured in this study. Childhood represents a state of particular vulnerability to environmental pollution,^{27,28} although not included in our sample, we suggest future study of community benefit and environmental pollution concerns in the context of pediatric dedicated hospitals. While not generalizable to states other than NYS, this study raises awareness and offers insight into questions that may be explored in other states and regions, or nationally.

Community benefit documents may not capture the totality of assessments, partnerships, support, or activities hospitals undertake in addressing upstream determinants of health (including environmental pollution). This could occur if such was not conceptualized as community benefit work or if there was an omission in reporting. Yet, one strength of the use of community benefit documents is the intentionality in the creation of the documents and the incentive to show work in community benefit. In future research, qualitative analysis approaches such as case method or grounded theory may be useful in broadening sensitivity and further exploring the phenomena of hospital engagement with environmental pollution.

Interpretation

The findings describe important and until now uninvestigated phenomena. They reveal a gap in hospital action related to environmental pollution. Although there is a moderate level of assessment and identification of pollution by NYS nonprofit hospitals, they have not taken action when pollution is identified as a community health need.

The findings of substantial hospital engagement in assessment and identification of pollution as a

Implications for Policy & Practice

The implementation of hospital community benefit policy involves discernment and action on community-level determinants of health. As pollution is a substantial health determinant and contributes to racial and economic health inequities, greater consideration should be directed to environmental pollution in community benefit efforts.

- We found that more than half of the NYS hospitals in our sample evidenced some assessment of environmental pollution. Holding a commitment to social justice in hospital mission predicted assessment of pollution.
- Nearly 19% of the hospitals identified pollution as a priority community health need. We found that hospitals that identified pollution as a priority need did not advance to action on this concern.
- Awareness of these findings may alert both hospital actors and community partners to the potential to advance together to assessment and warranted action on environmental pollution. Considerations of justice may support such actions.
- Our finding of the lack of action by hospitals to redress pollution when identified as a community health need calls for both further investigation of the nature of this obstruction of action and development of best policy and practices to move to action on pollution when present as a threat to community health.

community need represent an extension of a paradigmatic boundary to include pollution in the appreciation of social and environmental determinants of health. However, hospital engagement of environmental pollution, as measured in this study, has not reached full actualization with regard to planning and action to address pollution. The literature reveals that for hospitals having identified community health needs related to social determinants, many do not go on to address these needs.^{19,45,46} The drop-off from identification to action on environmental pollution-related community health needs was absolute in our study.

Our findings also indicate that holding an institutional commitment to social justice predicted community benefit-related assessment of environmental pollution. It may be that consideration of justice leads to a fuller and more critical appreciation of the social, built, and natural environments.

Understanding barriers and developing policy pathways for hospitals to participate in addressing pollution where it exists as a community health need are areas for future research and practice. Potential points to pursue include purposeful data gathering

that is sensitive to environmental pollution as a local health threat and development of strategies to discern and critically engage the health-related utility of actions to address pollution. Furthermore, there is a need to develop informed guidance on institutional culture change and strategies for hospital leadership, advocacy, support, and partnership in the complex matrix of power and economics that relate to local policy and structural decisions on pollution, exposure, and health. Continued knowledge development and strategies for dissemination of harm reduction behaviors in the face of pollution exposure are also relevant.

Broadening the lane of hospitals to join in efforts to improve the conditions that profoundly affect health and health disparity is, as Berwick⁴⁷ has put forth, a moral call. If hospitals are to act on community health needs that involve social and environmental health and disparities associated with structural racism and economic injustice, greater guidance, visibility of pathways, and strengthening of evidence-driven approaches are needed. Given the magnitude of the impact of environmental pollution on health and health equity, the need to support hospital movement to action on environmental pollution is particularly acute.

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