



Environmental Inequalities in Global Health 40

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Abstract

Vast differences in environmental exposures exist between socioeconomic groups at the global, regional, and local level. The associated adverse health outcomes are largely avoidable by policy decisions and therefore unfair and unjust. The definitions of environmental inequality and environmental justice are not clear-cut and depend on the local context. Nevertheless, limited access to scarce resources, power dynamics, and socioeconomic differences seem to be the common denominators underlying environmental inequalities. This chapter explores inequalities in environmental health through the urban lens, focusing on accelerated urbanization, the built and physical urban environment, disproportionate health effects of environmental exposures, and general recommendations to

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decrease environmental inequalities in cities. Integrating health into urban planning is critical. Emphasis should not exclusively be on the built environment, but also on immaterial dimensions such as perceptions of security, belonging, participation, and, above all, on equity. In order to overcome environmental inequalities, this chapter concludes by calling for transdisciplinary collaboration, a reinforced focus on policy integration in line with the Health in All Policies (HiAP) concept and equal involvement and participation of socioeconomic groups in policy decisions.

Keywords

Environmental health · Environmental inequality · Environmental justice · Urban health · Planetary health · Socioeconomic determinants of health · Health in All Policies

Introduction

At the time of writing, the COVID-19 crisis is still ongoing. While it is too early to assess and understand all influencing factors and consequences, it has already become apparent that this disease is not affecting everyone in an equal manner. Environmental inequality (exposure to air pollution) and social gradients are affecting the severity and criticality of the manifestation of COVID-19. As seen during the outbreaks of the Spanish Influenza and H1N1, the poorest populations, ethnic minorities, and those living in the most deprived (urban) areas are affected disproportionately. Not only are they more prone to get infected, but the disease is also more likely to run a severe course in these individuals than in their more affluent counterparts, leading to higher levels of mortality (Bambra et al. 2020). In preliminary data from Spain, this discrepancy is painfully revealed through the sixfold infection rate in the most deprived areas as compared to the most affluent (Generalitat de Catalunya 2020; Bambra et al. 2020). Further inequalities are observed based on ethnicity, with an overrepresentation of people of color and ethnic minorities falling critically ill (Bambra et al. 2020). In Chicago, 44% of people who died of COVID-19 were African-American (June 17, 2020), and the mortality rate of black and white residents differed nearly by a factor of three (City of Chicago 2020).

A complex interplay of health determinants underlies the unequal distribution of the COVID-19 burden. Among these are socioeconomic differences in the direct living environment and the associated health impacts causing the underlying conditions that exacerbate COVID-19 manifestations. Given that adverse health outcomes attributable to environmental factors are largely avoidable, differences among social groups are unfair and unjust.

In order to tackle environmental inequalities and promote health equity and sustainable development, it is of the utmost importance to understand the causal framework of interactions between society and the environment. This includes the human impact on the environment and vice versa because of the interdependence of the components. Nevertheless, many more aspects should be taken into consideration.

Fig. 1 Integrating equity into the Drivers-Pressure-State-Impact-Response (DPSIR) framework. (Source: Gupta et al. 2020)



Global health as a research field strives to overcome health inequalities and to promote health equity through multidimensional action transcending geographic and disciplinary borders. It recognizes that the overall health status is a result of the complex interplay of health determinants in, among others, (geo)political, trade, environmental, and socioeconomic dimensions, each manifested at the global, regional, and local level. This systemic approach also applies to environmental health and environmental inequalities. A framework that has been widely adopted for the assessment of environmental challenges, and the assessment and monitoring of policy responses is the Drivers-Pressure-State-Impact-Response (DPSIR) framework (Fig. 1). Developed in 1999 by the European Environmental Agency, this framework is based on the assumption of a chain reaction of causal factors that starts with “drivers” (e.g. economic growth, technologies) and via “pressures” (e.g. greenhouse gas emissions, food production, and waste), moves to “states” (e.g. distribution of exposure to environmental risks and benefits), and “impacts” on ecosystems and human health, eventually leading to political “responses” (Gupta et al. 2020). The original framework, however, marginalizes matters of equity and justice. In order to avoid perpetuation of existing discrepancies between groups of individuals, Gupta et al. (2020) introduced a set of questions tied to each stage of the framework that allow identification and assessment of the underlying influences and factors that determine environmental inequality.

As equity is central to sustainable development, this chapter discusses environmental inequalities in global health. It will first present a general overview to demonstrate environmental inequalities, provide a definition for environmental inequality and environmental justice, and engage in an in-depth discussion from

the urban perspective. It will conclude by stressing the importance of transdisciplinary collaboration and a reinforced focus on policy integration and inclusivity for the promotion of environmental equity and ultimately global health.

Environmental Inequality: A Multidimensional Problem

Climate change is a strong driver of environmental inequality globally. The Intergovernmental Panel on Climate Change (IPCC) reported that climate change is likely to increase poverty and inequalities, especially for those who are part of a vulnerable social group for reasons of race, gender, class, or disability. Temperature increases of 1.5 °C will disproportionately impact disadvantaged social groups through exposure to droughts and water scarcity, increased flooding, additional heat-related deaths, and productivity loss of outdoor workforce (IPCC 2018). Considerable losses of income for the poorest 20% are predicted, mainly due to exacerbated health conditions (e.g., premature deaths due to heat-related illnesses and air pollution) and increased food prices (decreases in fertile lands, failed harvests) (IPCC 2018).

As a demonstration of the latter, the growing global population and unsustainable practices in trade and manufacturing put a serious strain on water resources for food security. Virtual transfer of water means that in theory water is shifted from areas rich in water supplies to areas suffering from drought through trade in food and industrial commodities. In reality however, water often flows in the opposite direction, causing serious harm in already dry regions (Vos and Boelens 2018). Currently, 30% of the global water withdrawal is used for agricultural export. Major agricultural exporting regions can be found in Mexico, Peru, Chile, North Africa, India, Pakistan, and Southern Thailand. Water in these countries is governed by a small number of strong stakeholders, leaving marginalized groups with the negative side effects of surface and groundwater depletion, and water pollution. Further, as water flows are increasingly governed by large-scale multinationals, investment decisions are rapidly gaining influence at the expense of democratic governments and responsible water stewardship (Vos and Boelens 2018).

The past decades have been characterized by an intensification of virtual water trade and hence an increased dependency on a limited number of exporting countries. In fact, the number of net importers per net exporter has increased from 1.3 in 1986 to 2.5 in 2010, leaving the majority of the global population vulnerable to the parties controlling water supply (Fig. 2) (Carr et al. 2013). Most virtual water traded is used for cereal grains, oils, and cotton lint, although luxury products such as chocolate, coffee, and bovine meat are steadily increasing in the top 15 products.

Further, environmental pollution forms a great threat to the health and livelihood of people across the planet. The burden of pollution, especially caused by industrial emissions, traffic and toxic chemicals, is disproportionately high in low- and middle-income countries (Landrigan et al. 2018). It is estimated that nine million premature deaths, 16% of the global mortality, are attributable to pollution. Nearly 92% of those deaths occur in low- and middle-income countries, and in any country, premature death attributable to pollution is most prevalent among marginalized

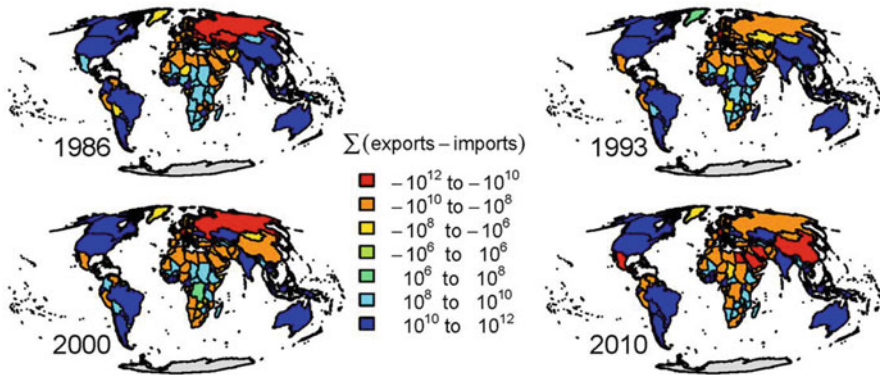


Fig. 2 Virtual water trade in 1986, 1993, 2000, and 2010. Countries in red, orange, yellow, and green are net virtual water importers, and countries in blue are net virtual water exporters (Source: Carr et al. 2013)

populations (Landrigan et al. 2018). Non-communicable diseases account for 71% of the total burden of disease caused by pollution, the relative risk of which increases with the level of exposure. Pulmonary diseases caused by air pollution are most prominent, followed by stroke, ischemic heart disease, and cardiovascular disease (Landrigan et al. 2018). A clear intersection of pollution and environmental inequality at the global level can be found in the outsourcing of hazardous waste (Walker 2009). High-income countries are known to ship industrial waste and toxic chemicals that are strictly regulated in the EU or the USA to low-income countries with less stringent regulation and/or that are lacking the means to enforce environmental regulations. Examples hereof include the shipment of European toxic waste to Côte d'Ivoire, causing respiratory and gastrointestinal disease cases in the local population, as well as electronic waste dumpsites in poor African neighborhoods with materials originating from European used computers (Landrigan et al. 2018).

Similar patterns are evident at the local level. Strong correlations exist between environmental inequality and both race and class, with race being the most important driver indicator for environmental inequality in the USA (Brulle and Pellow 2006; Kruize et al. 2014). Recent European studies, as well as research conducted in Australia, Canada, and South Africa, confirm the association between higher exposure to environmental burdens (among others air pollution, noise pollution, limited access to green space, exposure to contaminated and/or toxic substances, poor sanitation and housing conditions, etc.) and low socioeconomic status (Kruize et al. 2014).

Inequalities in environmental exposures ultimately lead to unequal health outcomes. An additional factor contributing to ill-health is that people of low socioeconomic status tend to be more vulnerable to adverse health effects resulting from these exposures. Disadvantaged groups tend to have a poorer health status than the general population, meaning that environmental exposures may cause more severe health effects in deprived communities and have an impact at lower exposure levels due to underlying conditions. Further, vulnerable groups may lack the specific health literacy and coping capacities to mitigate adverse health impacts (Kruize et al. 2014).

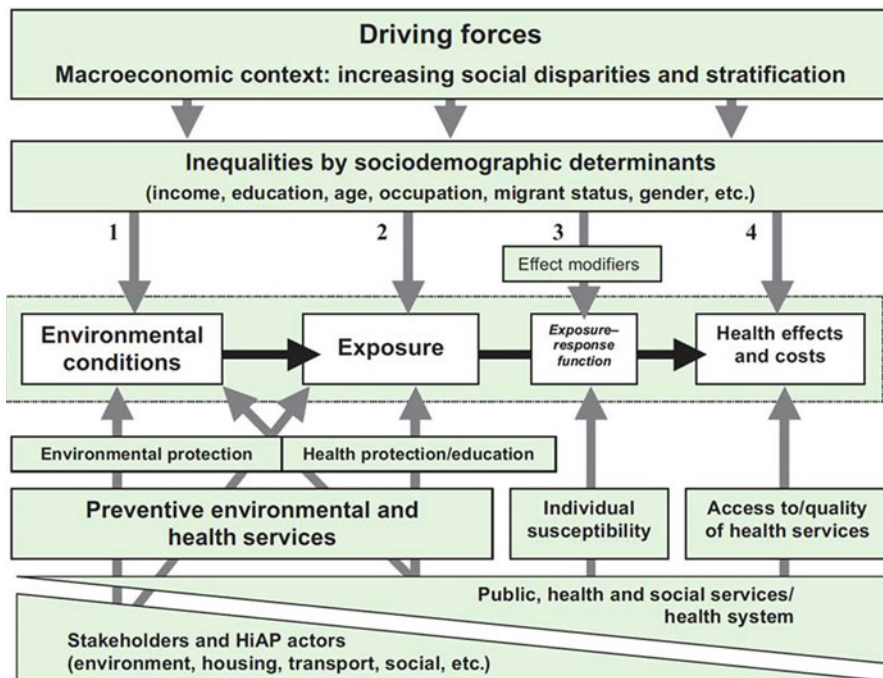


Fig. 3 WHO framework model on social inequalities and environmental risks (Source: WHO 2010)

Environmental health as a central component of global health, hence is the result of intricate relations between environmental exposures, and socioeconomic and (geo)political determinants of health. In 2010, the WHO published a comprehensive framework on social inequalities and environmental risks (Fig. 3). The four arrows depict the social determinants resulting in the environmental conditions of individuals (arrow 1); the determinants affecting exposure beyond the environmental conditions, such as adverse health behavior or a lack of health education (arrow 2); the potentially more severe reaction to exposure in disadvantaged groups due to effect modifiers (e.g., underlying conditions) (arrow 3); and finally, the ultimate health effects caused by differences in socioeconomic health determinants (arrow 4) (WHO 2010). However, before these underlying connections are further explored, it is important to clearly define what environmental inequality entails.

Definitions of Environmental Inequality and Environmental Justice

Defining environmental inequality is not straightforward. Pellow (2000) describes the concept as the unequal distribution of environmental burdens, constituted by underlying social structures. These environmental burdens include, but are not

limited to, unequal exposure to sources of pollution, insufficient quality of living and housing conditions, and limited access to green spaces. The term focuses on the interplay between environmental quality and social hierarchy and is not limited to specific social groups. The striking differences of exposure to environmental burdens are produced by a complex process of context-specific stakeholders competing for scarce resources, examples of which are clean and safe living and working environments, water, fertile land, power, status, and financial resources. Stakeholders with the best access to and/or control of such scarcities have the ability to deprive others of these goods, and stakeholders who are ill-equipped to gain access are most likely to suffer from an unequal environmental burden (Pellow 2000). As stakeholders and relevant resources vary per specific context, environmental inequality conflicts may vary in extent and complexity. Nevertheless, clear patterns of stakeholder conflicts emerge on every level (Pellow 2000).

Brulle and Pellow (2006) argue that two key dynamics underlie environmental inequality: capitalism and institutionalized racism. The inherent logic of the globalized market economy was designed to optimally follow the principle of generating economic wealth by profit maximization and a simultaneous race-to-the-bottom for the lowest production costs. As a result, industries and other polluting infrastructures are located where ground production costs, including those resulting from environmental regulations and political resistance, are low. Hence, along with increasing wealth, the market economy – when allowed to externalize environmental costs – also creates significant ecological harms. The benefits and burdens are unevenly distributed in favor of more affluent and influential social groups able to represent themselves and their interests in (local) politics to voice their needs. As politics often choose the path of least resistance, poorer communities with fewer abilities to resist the location of polluting facilities will more likely be subjected to polluting facilities in their surroundings (Brulle and Pellow 2006). Further, institutionalized racism presents limited choices of residential areas for people of color, along with fewer educational and employment opportunities (Brulle and Pellow 2006). As a result, communities of low socioeconomic status often coincide with communities of non-white populations. Further, people of color tend to be more socially isolated and are relatively powerless in politics, only worsening the disparities (Kruize et al. 2014).

Strongly related to environmental inequality is the environmental justice movement. The term environmental justice was originally formulated in the USA in the 1960s and 1970s (Pedersen 2011). After the successful campaigning for the Civil Rights Act in 1964, African American communities shifted their attention to other areas of persisting discrimination, among which was access to healthy environments (Pedersen 2011). The original conjunction of the words is attributable to US campaigners resisting the imposition of toxic and polluting facilities in the minority and poor areas (Walker 2009).

The 1991 summit of National People of Color in Washington DC was dedicated to environmental justice and gave rise to 17 Principles of Environmental Injustice (Pedersen 2011). President Clinton signed an executive order on environmental justice in 1994 that nevertheless failed to define the term, leaving the US Environmental Protection Agency (EPA) to pin down the following definition, placing more emphasis on participation:

The fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies (EPA 2018).

This definition, however, was constructed based on the American context and has since extended beyond those origins (Walker 2009). Scholars such as David Schlosberg and Ryan Holifield argue that the current language is inadequate and that researchers continue to disagree on an inclusive definition and interpretation of environmental justice (Holifield 2001; Schlosberg 2007). Holifield finds the pursuit for a stable definition misguided as people from different geographical, historical, political, and institutional contexts interpret the term differently. He states that environmental justice will never unproblematically refer to a single set of measurable conditions but will continue to have different meanings in different contexts (Holifield 2001). Schlosberg, too, refers to the diversity of environmental justice movements and in addition argues that a definition of environmental justice based merely on fair processes of distribution is inadequate and begs for an understanding of the principles underlying unequal distribution of environmental “goods” and “bads”, including notions of societal recognition and participation (Schlosberg 2007).

Urban Perspectives on Environmental Inequalities

Although common denominators underlie environmental inequality, understanding the actual causes, drivers, and implications of the concept in more detail requires insight in the respective context and/or the specific area of concern. Only too often, important aspects of environmental inequality can be found in cities. The year 2008 marked the first time in the history of humanity that half of the human population (3.3 billion people) was living in urban areas (UNFPA 2007); in 2017, the number of city dwellers was 55%, although this may be an underestimation due to the lack of a universal definition for urban areas (Ritchie and Roser 2018). With the high concentration of population and economic activity, the urban living environment is an important factor contributing to environmental health, making cities potent drivers for global health in general (WHO 2020). The accelerated growth rate of the urban population however, represents an obstacle for development and may precipitate critical environmental problems (Mitsakou et al. 2019; Marmot et al. 2008; Bloom et al. 2008).

The three major reasons for the degradation of the physical urban environment are air pollution, poor waste management, and the contamination of drinking water and soils. These result in adverse health effects, hinder measures to combat low average life expectancy at birth, and influence inter alia high death rates for infants and children under five (Santana 2009a; Friel et al. 2011). Strong urban growth in the late twentieth and early twenty-first centuries appears to be responsible for the reversal of the positive association between the urbanization rate and average life expectancy observed in 1990 (Bloom et al. 2008). Indeed, the recent urban growth rate (observed from 2000 to 2017) has shown a negative and significant correlation of

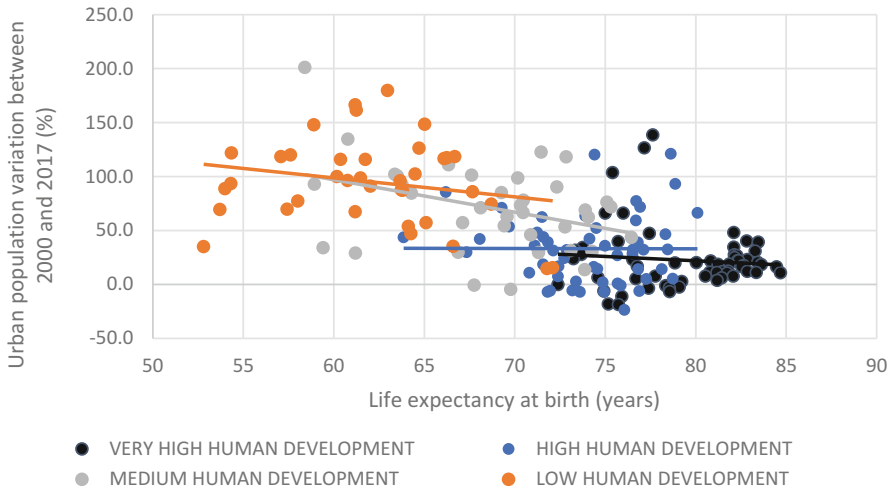


Fig. 4 Urban population variation between 2000 and 2017 and life expectancy in 2017 by Human Development Index in 2018 (Source: Data from the United Nations Development Programme 2020. Determination coefficient: 0.01 in very high human development countries; 0.00 in high human development countries; 0.13 in medium human development countries; and 0.05 in low human development countries. Outliers remover: Qatar; United Arab Emirates)

37% with average life expectancy at birth in 2017 (Fig. 4). This relationship is even more evident in the urban population of poorer countries (low and medium Human Development Index), who are experiencing a double burden of health problems (Fig. 5). This phenomenon was also referred to as “new urban penalty” to reflect the degeneration of the living environment and urban health in excessively growing urban clusters (Krafft et al. 2003). Not only do these populations suffer from communicable diseases, but they also carry the burden of conditions associated with economically developed societies, such as mental disorders, chronic ailments, and traffic accidents. The prevalence rates of these diseases are high and associated with social determinants (lack of conditions in housing, for example), behaviors (consumption of alcohol and tobacco), sedentary life styles, and a change in eating habits (Montgomery and Ezeh 2005).

In the coming years, urbanization will intensify, principally in those urban agglomerations of over four million inhabitants located in developing countries. In 2035, the 30 biggest cities will concentrate nearly 650 million inhabitants, doubling the population in 2000 (UN Department of Economic Social Affairs 2019) (Fig. 6).

Accelerated population growth in urban and suburban areas requires urgent attention, mainly in the identification of critical public health questions associated with the conditions for territorial planning and management, in addition to climate change (Friel et al. 2011). In fact, in developed countries, the growing number of poor migrants that leave behind their rural livelihood for urban areas or cities creates social and economic conflicts with measurable results seen in increased urban poverty, social strife, violence, and health concerns if the demographic process of

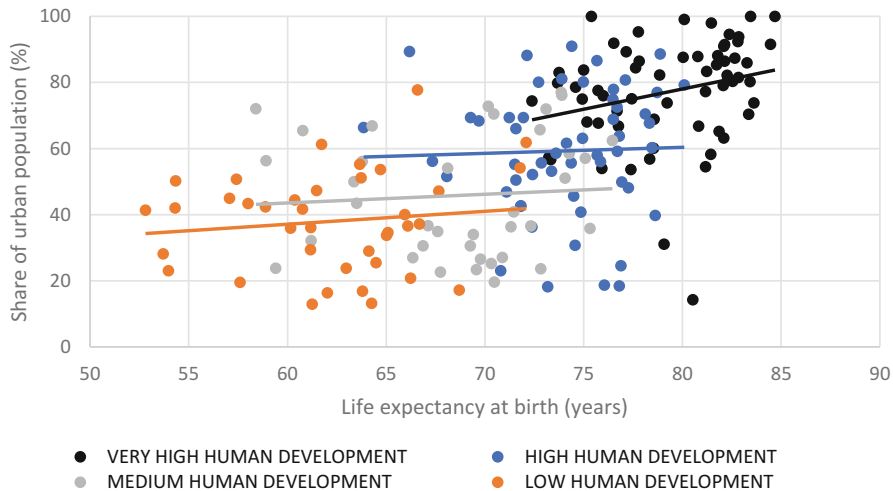


Fig. 5 Share of urban population and life expectancy in 2017 (Source: Data from the United Nations Development Programme 2020. Determination coefficient: 0.06 in very high human development countries; 0.00 in high human development countries; 0.01 in medium human development countries; and 0.02 in low human development countries)

urbanization is not accompanied by the development of adequate infrastructures and services for a better distribution of wealth (Rodríguez-Sanz et al. 2019; Mouton et al. 2019; Harding et al. 2008; Cole et al. 2017). The capacity of cities for resilience is a fundamental condition for reducing poverty globally, especially in the developing world. On a global scale, 4.2 billion city dwellers are suffering from substandard conditions in their immediate living area. This includes housing, transport, sanitation, waste management, air quality, noise pollution, soil contamination, and access to green and blue spaces, among others (Samoli et al. 2019; WHO 2020). When infrastructures are deficient or when the public access systems are inadequate (Bright and Kuper 2018), and weaknesses persist in the job market, in other words, when opportunities are limited, it becomes difficult to build healthy cities in which the chain of determinants of poverty and disease can be broken (Mouton et al. 2019; Cole et al. 2017).

Again relating to Pellow's (2000) theory about stakeholder access to (urban) scarcities, it is not hard to imagine how certain social groups may disproportionately be exposed to poor urban living conditions. Indeed, research has shown strong relationships between deprivation and the quality of immediate urban surroundings (Samoli et al. 2019; Rodríguez-Sanz et al. 2019; Giles-Corti et al. 2016; Costa et al. 2019; Shaw 2004). These phenomena do not only occur in low- and middle-income countries, but are also widely present in the metropolitan areas of developed countries.

According to Northridge and Freeman (2011) several pathways determine the influence of urban planning on health equity. The first is access to material and other resources. This is determined by the proximity of shops and services supporting

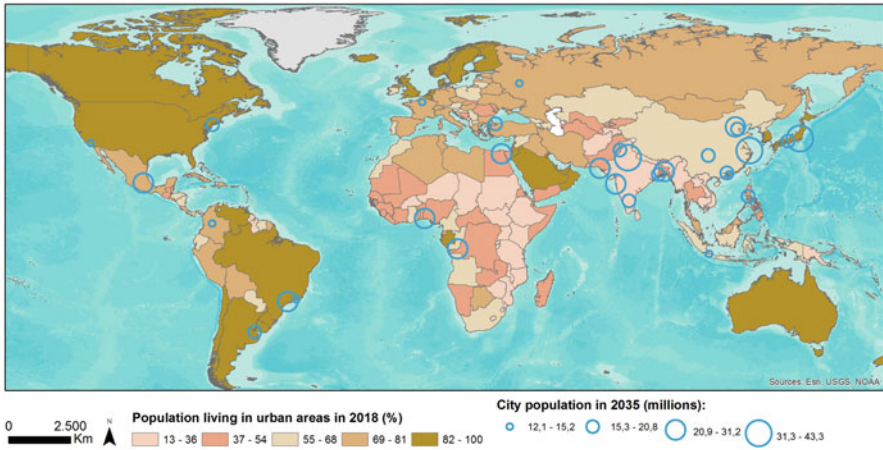


Fig. 6 World's 30 largest cities (by 2015 population) in 2035. (Source: United Nations, Department of Economic and Social Affairs, Population Division (2018))

health, such as access to healthy foods. Secondly, the physical and social environments play a decisive role, for instance, through the possibility of non-motorized (hence active) travel, safe housing, blue and green spaces promoting physical activity and mental health, and schools (Borrell et al. 2013; Northridge and Freeman 2011). Conversely, some neighborhoods may suffer from proximity to busy roads, unsafe public spaces, unhealthy housing due to mold or lead paint, or an overrepresentation of unhealthy facilities such as shisha lounges and fast food chains. The third and last pathway is the extent to which communities have the opportunities and political power to change their situation (Northridge and Freeman 2011). For example, can the local government be mobilized to realize weekly fruit markets or more possibilities for outdoor physical activities?

The (urban) environment can hence both be beneficial and detrimental to health, depending on the local context. Healthier urban environments can for example be created by improving road infrastructures and green spaces. Neighborhoods with good street connectivity promote active travel such as walking or cycling, whereas access to green spaces has been related to improved air quality, heat reduction, and mental health and physical activity, as well as decreased mortality and morbidity related to cardiovascular disease (Mitsakou et al. 2019; Lee and Maheswaran 2011).

Contrarily, poor urban environments and housing conditions adversely affect both physical and mental health. The most prominent indoor factors influencing physical health are temperature, humidity, and ventilation. Both in periods of heat and cold, excess deaths occur through pulmonary, cardiovascular, and renal pathways (Shaw 2004; Knowlton et al. 2009; Huynen et al. 2001). These seasonal variances in mortality are in part related to housing conditions, in which poor insulation plays an important role (Shaw 2004). Further, damp and poorly ventilated homes provide perfect conditions for mold, fungi, and other microorganisms influencing health. The presence of such microorganisms is associated with the presence of house

mites, as well as the development and exacerbation of asthma, diarrhea, headaches, wheezing, fevers, and pain, among others. Children are mostly affected (Shaw 2004). In addition, people living in poor housing conditions report relatively high levels of stress (Shaw 2004). Outside of the house, people with less access to green and blue spaces, and those who perceive their neighborhoods as unsafe, are less likely to engage in active transport or outdoor physical activity, tend to consume more alcohol, and more often report stress and signs of depression (Renalds et al. 2010). Further, the placement of unhealthy food and lifestyle options influences one's life choices and chronic health status considerably (Northridge and Freeman 2011).

Given the complex interplay of health determinants, measuring health status is a highly complex issue that calls for multifaceted methods (Costa et al. 2019). Also within cities, the health status of the urban population can vary greatly, and capturing the local health status adequately is important to target interventions appropriately. To capture the interconnectedness of the determinants of (environmental) health, a Population Health Index (PHI) was developed in Europe to assess variations in population health status and to inform targeted policy interventions (Santana 2017). This tool allows for the integrated assessment of dimensions and indicators of two components, health determinants and health outcomes, to appraise population health and inequalities in various dimensions. The Health Determinants Index includes (but is not limited to) economic conditions, social protection, education, demographic change, the built and physical environment, and road safety, whereas the Health Outcomes Index is comprised of integrated measures of morbidity and mortality (Costa et al. 2019). A closer examination of nine European metropolitan areas using the PHI revealed spatial clustering of poor values of the integrated health determinants index, and poor values of overall health outcomes index of the population residing in these areas, exposing intraurban inequalities in (environmental) health determinants and health outcomes (Fig. 7).

Values of the Health Determinants Index are represented by backward diagonal shading, and values of the Health Outcomes Index are depicted by forward diagonal shading. Municipalities with low value scores, surrounded by other municipalities with low value scores, are depicted in blue. Municipalities with high value scores, surrounded by other municipalities with high value scores, are depicted in red.

Toward a More Equitable Paradigm for Global Health

These inequalities often originate from a lack of representability and inclusion in political processes, as well as serious limitations in mobility due to economic reasons or exclusion based on a minority social position (i.e., race, sexual orientation, religion, etc.) (Northridge and Freeman 2011). In other words, some people simply do not get to choose where they live to the same extent as others, nor are they involved in the decision-making process of the urban layout as much. Thus, relying on the individual capability to improve the immediate environment will likely sustain disparities, and inclusive policy is needed as a means to promote environmental and health equality.

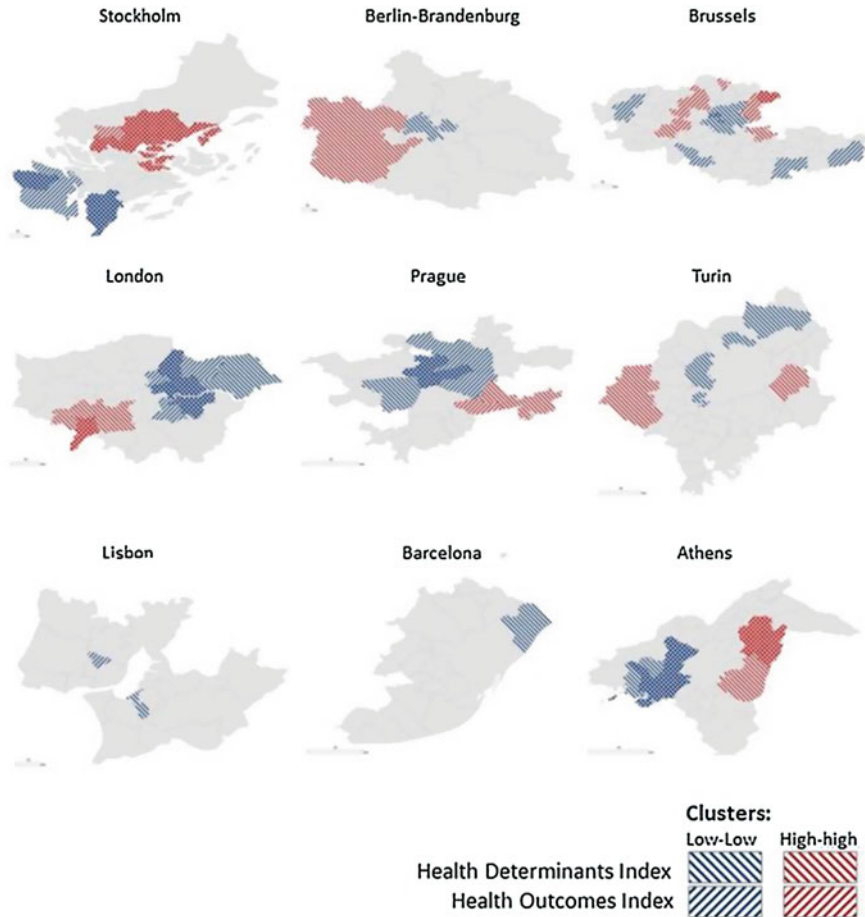


Fig. 7 Spatial clustering of the outcomes of the Health Determinants Index and the Health Outcomes Index in nine European metropolitan areas. (Source: Costa et al. 2019)

The contemporary challenges confronting environmental health will likely intensify in the twenty-first century and demand innovative and adequate solutions adapted to the specificities of regions, countries, and population groups (Giles-Corti et al. 2016). Given that health is determined by a broad range of factors involving all sectors of society, the solutions for problems associated with global environmental health are transversal in scope, and attaining sustainable and healthy urbanization becomes a responsibility to be shared by all (Marmot et al. 2008). Health must be placed at the center of the city’s political and social agenda. We have known since the 1970s that in order to achieve health gains, health services are insufficient in and of themselves. The Alma-Ata Declaration, precisely 42 years ago, called attention to the role of various institutions and sectors of activity in health

promotion and disease prevention, mainly in those countries displaying the greatest economic and social vulnerability. Today, a need for reinforced policy integration exists, requiring efforts of institutions and governments with respect to the communication and coordination of activities with the objective of greater health equity. The response to the COVID-19 crisis and the associated public investments to stabilize the ailing economies is an example of a global crisis that also provides a window of opportunity for significant change. Although there has been influential lobbying for distributing the available funds with short-term perspectives to stabilize the status quo ante and to support unsustainable and outdated structures, the immense investments could alternatively be aimed at sustainable modes of transport and production and integrative policies with health and equity as core values.

Such an approach requires to be fully in line with the concept of Health in All Policies (HiAP), which entails the systematic integration of health implications in public policy decisions, hence seeking synergies in health and public policies and avoiding harmful health impacts. HiAP was reinforced by the WHO in 2011, in the Rio Political Declaration on Social Determinants of Health (WHO 2013). A concrete example can be found in the Road Traffic Safety Bill in Sweden, aiming to achieve Vision Zero: zero deaths or serious injuries in the road transport system. The prevention of road crashes was aimed to be achieved through safe road designs, law enforcement, introducing fuel consumption as a performance indicator for transport operations and using less aggressive driving as a solution for environmental concerns. The bill was considered a large success, achieving a threefold decrease in traffic injury fatalities (WHO 2012).

Further, in certain developed countries, higher levels of average life expectancy at birth were attained because public policies were designed and implemented as a way to understand and intervene with respect to the social, economic, and political determinants of health. Santana and Almendra (2018) identified this process in Portugal after the democratic revolution, where vertical mother-child programs were introduced parallel to social and economic shifts that supported improvements in housing, basic sanitation, hygiene, and lifestyle choices (diet). These events had a crucial role in the decrease of perinatal, neonatal, infant, and maternal mortality rates (Santana and Almendra 2018).

Better housing conditions, sanitation, and availability of drinking water, better safety at one's workplace, school, or place of residence, better access to health care services and education, and more adequate public transport networks are just some of the examples of the social determinants of health that may be attained when there is good urban governance (Santana 2009a). Reducing health inequalities and eradicating the material and immaterial conditions of poverty and deprivation in urban and suburban areas require and demand resources – both public and private aid and investment – to be simultaneously combined with a firm commitment to improving urban governance. Urban planning should be recognized as a key process so that environmental support is created to promote sustainability and health equity (Friel et al. 2011; Bell et al. 2010).

Unfortunately, at this point we are far from attaining the social and political commitment that would lead to assessing and monitoring the impact of the physical

and social environment of populations and urban communities, in both an intersectorial perspective (housing, transport, safety, industry, tourism, agriculture, etc.) and a multilevel perspective (citizens, community, country, and region) (Marmot et al. 2008). What has been happening in practice is the channeling of investments, especially curative health services focused on specific diseases. This not only applies to the urban aspect of environmental health, but also to all of its manifestations globally. From a global health perspective and taking into account the systemic nature of environmental health, we need to expand the assessment, planning, and actions in public health beyond the restricted field of the health sector and beyond the traditional stakeholders of national governments and international institutions (Friel and Marmot 2011). In order to overcome health inequities, decision-makers should be considerate of and invite stakeholders on every level, including civil society organizations, local governments, NGOs, national representatives, and international institutions. Health indeed should be central to all policies, as policy decisions, regardless of the specific discipline they aim to serve, have incontrovertible implications to the (environmental) health of populations across the planet.

Conclusion

The research area of global health recognizes the transnational, multidimensional determinants of health and strives for health equity through interdisciplinary collaboration within and beyond the field of public health. Drivers and determinants of health cannot be viewed in isolation but rather constitute an interconnected framework, transcending geographic and disciplinary borders from the global to the local level, and affecting population health depending on the local context. As a central component of global health, environmental health too is a result of interdependent dimensions, including global trade, the political landscape, human activities, emissions, (urban) policy decisions, and local stakeholder competition. Inequalities in environmental exposure at the global, regional, and local level lead to unequal and avoidable health outcomes and hence require urgent attention. Nevertheless, the definitions of and concepts underlying environmental inequality and environmental justice are not clear-cut.

Environmental inequality is described as the unequal distribution of environmental burdens, constituted by underlying social structures (Pellow 2000). However, environmental inequality is not merely a distributional issue but is further characterized by a lack of advocacy, involvement, and participation of vulnerable groups in the policy decision-making process. Differences in exposure to environmental burdens are produced by a complex process of context-specific stakeholders competing for scarce resources, among which are natural resources, power, and financial means. This scarcity, along with power dynamics and socioeconomic differences, seems to be a common denominator of environmental inequality.

As the global urban population exceeds the rural population and continues to grow, the urban environment will have to function as a potent driver for environmental health. Despite the benefits attributable to urbanization however, the increased growth rate of the urban population forms an obstacle for development

and environmental health (Mitsakou et al. 2019; Marmot et al. 2008; Bloom et al. 2008). Given that the urbanization will intensify in the years to come, accelerated population growth in urban and suburban areas requires urgent attention, mainly in the identification of critical public health questions associated with the conditions for territorial planning and management (Friel et al. 2011).

Strong relationships between deprivation and the quality of the immediate urban surroundings exist, and research shows evident patterns between socioeconomic status, exposure to the built and physical environment and overall health status (Samoli et al. 2019; Rodríguez-Sanz et al. 2019; Giles-Corti et al. 2016; Costa et al. 2019; Shaw 2004). These environmental inequalities in health can be improved through local policy decisions of territorial and urban planning, the core of which – in addition to the traditional, eminently physical aspects (outlined by channels or means of communication) – must emphasize immaterial dimensions (perceptions of security, feelings of belonging to a place, confidence, solidarity, communion, participation, relationships, etc.), equity, and the common good as a synthesis of order and justice. In this context, new methodologies and practices addressing inequalities in wealth distribution, subsidiarity, social justice, health and well-being, and environmental quality should be factored into the equation as basic principles of urban planning in the twenty-first century (Santana 2009b). Therefore, a holistic approach, balancing climatic and societal consequences of policy decisions, is needed for the long-term sustainability and health of urban communities.

An integrated approach is also needed in the regional and global context, where international collaboration and policy alignment are critical conditions to promote environmental equality. Globalization and the associated international connectedness require new paradigms to protect the health of all populations in a more equal manner, taking into account the systemic nature of health determinants. Comprehensive frameworks as well as strategic, enduring multilevel partnerships involving international institutions, national governments, multinational companies, NGOs, and civil society organizations are required for the development of successful initiatives to overcome environmental inequalities. This along with sustained financial commitment of both public and private investments, a strong emphasis on HiAP, and the involvement and participation of vulnerable groups is our best chance to break the perpetuation of existing discrepancies in the future.

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