Analysis of Energy Decision Making

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Making choices concerning energy sources entails examining several externalities or negative effects, calculating cost and quality trade-offs, analysing bigger economic concerns, and assessing health implications.

Externalitie

Every energy source has varying degrees of negative environmental, health, and societal consequences. Among these consequences include the occupational dangers linked with coal mining, the influence of dams on the levels of various infectious illnesses, and the health effects related with the use of conventional and fossil fuels. Those who are put at risk are not always the same individuals who profit from energy services, and the expenses associated with these consequences are not always reflected in the price paid by the end user. Externalities are negative effects that are not accounted for in the market price of energy [1], [2].

These externalities may have a large economic value. A European Commission study calculated the economic cost of externalities associated with transportation and electricity generation using coal, oil, gas, nuclear fission, and renewables, including the effects on morbidity and mortality due to air pollution and traffic accidents, damage to buildings and crops, and ecosystem disruption including climate change. The external costs of coal-fired electricity in several EU nations varied from 2 to 10 eurocents/kWh, compared to a market price of 3 to 4 eurocents European Commission, 2003. This cost compares to externality prices ranging from 1 to 4 eurocents/kWh for gas-fired electricity and less than 1 eurocent/kWh for hydroelectric, nuclear, solar, and wind power. Externality costs influence decision making by giving implicit subsidies at the expense of the broader population. When these expenses are added to the market price imposed by providers and paid by customers, coal and other fossil fuels become more costly when compared to cleaner alternatives.

Various legislative and institutional initiatives may help to mitigate the decision-making biases caused by externalities. Externality costs associated with various energy sources may be reduced by reducing emissions via technological upgrades or stricter regulation. Externality costs may also be internalised by including them into the cost of certain energy sources via levies. Market pricing would better represent the real societal costs of various energy sources, but total energy costs would rise. Direct subsidies, on the other hand, might be offered to encourage the adoption of cleaner sources, thus equalising the amount of subsidy without raising energy prices [3]–[5].

Economics

Household and national energy-use choices are inextricably linked to economy. The socioeconomic level of a home or nation influences the energy options that are genuinely accessible, and the availability of inexpensive energy may have a significant effect on the economic level of a home or country. Economic progress requires a lot of energy. Access to inexpensive energy for factories, offices, and infrastructure is required for industrial growth. Affordably priced energy is also required for agricultural equipment, fertiliser manufacturing, irrigation, and processing. National governments regard affordable energy as critical to attracting investment and supporting economic development. This, however, has the potential

to undercut regulatory attempts to internalise negative externalities or to encourage people or enterprises to move up the energy ladder. This apparent conflict between economic expansion and energy considerations exists in both developed and developing nations. Consumers in wealthy nations, on the other hand, may be better capable of paying for environmental improvements without risking economic development. Access to economical and accessible energy, such as propane for heating and cooking and electricity for lighting, may considerably enhance household production in developing nations. By eliminating the need to gather fuelwood, propane for cooking may provide mothers and children more time. A residential electrical connection increases available daytime hours and allows for a variety of household businesses.

Health Impact Assessment

Choices on energy policies and programmes have consequences that extend beyond public health to problems of economic development, environmental quality, reliance on other countries, and social consequences. As a consequence, it might be difficult for decision makers to recognise and consider the public health implications of their actions at times. This presents a challenge to community health specialists who are responsible for ensuring that these consequences are fully examined. The process of detecting, measuring, and conveying these consequences to decision makers is known as health impact assessment HIA.

Energy policy choices are influenced by a variety of factors, including economic growth, national security, accessing, and environmental concerns. It is frequently difficult to identify the direct influence of these policies on public health in this complicated combination. Yet, energy choices are, in many respects, public health issues, even if they are not addressed or argued in those terms. Following are some examples of how energy and associated policy choices may have a direct impact on public health:

1. European gasoline taxes are substantially higher than those in the United States, resulting in lower private car usage and emissions.
2. The absence of incentives tax breaks of direct investment for alternative energy research and development is expected to decrease the contribution alternative energy sources can contribute to national and global power generation.
3. Attempts to safeguard or promote domestically accessible energy sources such as coal in the US in order to avoid dependence on imported sources may result in the prolonged use of a more polluting source.
4. Electrification efforts in underdeveloped nations may increase household energy consumption while also changing the major energy source utilised for example, from biomass to coal or natural gas.

A health impact assessment is a methodical technique to determining the influence of a programme or policy on the health of a given population, both good and negative. Its goal is to give credible information on the consequences to decision makers in order to enhance their decision making . The methodology has been applied to numerous projects, including roadways, transit projects waste site expansions, urban renewal plans. The method has also been used to energy projects ranging from hydroelectric power to energy conservation to infrastructure expenditures [6]–[8].

Lerer and Scudder 1999 discuss the probable consequences of the Lesotho Highlands Water Project, one of the worlds biggest dams that provides energy to both Lesotho and South Africa. The projects health impact evaluation considers all possible positive and negative health outcomes. Increased HIV as a result of construction-related migration and increased sexual behaviour, increases in parasitic diseases due to changing habitat for vectors such as mosquitoes, occupational injuries during construction, and decreased food security among the displaced population are all potential negative consequences. Beneficiaries may have less dependency on biomass fuels; enhanced food security as a result of expanded irrigation; and fewer accidents and diseases as a result of improved flood management.

Urbanization

The globe is becoming more urban. Just 5% of the world's population lived in cities at the turn of the nineteenth century. By the end of the twentieth century, that figure had climbed to over 46%. According to current forecasts, more than half of the world's population will be living in cities by 2007, and almost two-thirds of the world's population will be living in cities by 2030. The majority of global population increase in the future decades will occur in cities. The rate of growth in urban areas is expected to vary by region of the globe and beginning city size. The majority of global population increase will occur in less rich nations, with Asia and Africa seeing the fastest expansion. Despite the fact that North America and Europe are now the most urbanised areas, the number of urban inhabitants in the least urbanised region, Asia, was already bigger in 2000 than the combined urban populations of North America and Europe.

The most significant present worldwide demographic trend is undoubtedly urbanisation. It also reflects a transformation in the human environment, a significant shift in thousands of years of human ecology. As a result, it is critical to address the consequences of urbanisation for population health. This chapter provides an overview of urbanisation and its impact on population health. We begin by discussing some methodological challenges, namely issues with identifying and counting cities, as well as urbanisation itself. After that, we will look at why urbanisation is important for human health on a worldwide scale, concentrating on four mechanisms: demographic characteristics, service supply, the social environment, and the physical environment. We then provide a historical history of urban and health thought and explore how to analyse the data regarding urbanisation, city life, and health. We finish with thoughts on how to develop healthy cities and how urban planning and art direction might help enhance population health.

National governments have not generally embraced a definition of urban locations, and the functional concept of urban differs greatly among nations. Approximately half of the 228 countries with data on urban use administrative definitions for example, living in the capital city, 51 use size and density, 39 use functional characteristics for example, economic growth, 22 have no definition of urban, and 8 define all for example, Singapore or none for example, Polynesian countries of their population as urban. Official data from state organisations and the United Nations depend on country-specific classifications rather than a common definition of urban. In certain cases, definitions of urban in neighbouring nations differ greatly. In Bolivia, for example, urban areas comprise areas with a population of 2,000 or more people. In adjacent Peru, urban areas are defined as populous concentrations with 100 or more residences clustered together, as well as district administrative centres. Global urbanisation numbers therefore reflect international definitional disparities, statistical or historical precedence, and, in certain situations, political expediency.

Population Factors

Cities are fundamentally areas where huge numbers of people live in close proximity. Urban surroundings affect the resources accessible to these city people, their interpersonal relationships, and their lifestyle choices. As a result, demographic variables are among the most important elements influencing urban population health. City residents often interact with individuals from various financial backgrounds as well as racially and culturally diverse groupings. This observation prompts many thoughts. Secondly, although associating with socioeconomically and racially diverse people may be educational, it can also be stressful. Stress, in turn, may influence general health and mental health in particular. While most research has focused on individual-level stressors, environmental variables are increasingly being acknowledged as stressor sources and mediators of the influence of stressors on person health. Another crucial element is that people of various socioeconomic backgrounds may react differently to stressors such as murder or pollution, and they may have uneven access to resources for dealing with stresses.

Second, the close closeness of huge groups of people increases the possibility of contagion, both of contagious illnesses and of ideas and behaviours. While transmission of infectious illness is widely understood, contagion of ideas, actions, and social examples is a relatively recent notion. In epidemiology,

it is assumed that, all else being equal, the risk of transmission of infection is greater among persons living in close proximity than among people living in scattered groups. According to social learning theory, the same may be true for ideas and behaviour; for example, unhealthy practises or panic in the setting of a crisis may be more likely to spread in crowded metropolitan areas. Due to these variables, urban people may begin at a disadvantage when compared to nonurban communities.

Services and Resources

The availability of services and resources for urban people is linked to the function of urban environments in determining health. Cities in richer nations provide a wide range of health and social services, and even the poorest metropolitan area may have dozens of social service institutions, each with its own goal and portfolio. Even in poorer nations, cities are more inclined to provide social and health services than nonurban regions. These services may supplement and improve healthy health practises, or they may give health care to the sick. Nonetheless, low-income urban inhabitants usually have restricted access to services. Low-income persons and people of colour, who are overrepresented in metropolitan areas in the United States, are the most likely to lack health care coverage.

Those who are uninsured encounter impediments to treatment, get lower-quality care, and are more prone to depend on emergency services. Recent immigrants, homeless persons, and convicts released from jail or prison, all of whom are disproportionately represented in metropolitan areas, face additional barriers to health care access. These populations therefore place a strain on health-care systems that are underfunded or underprepared to care for them. Several cities show a significant gap in the quality of care offered to those living in affluent areas vs people living in poorer districts. Well-equipped, profitable medical practise prospects in a city attract service providers away from lower-paid public service clinics, especially when these latter institutions confront limited resources and shaky governmental commitment.

Social Environments

Cities population density and the particular living circumstances that typically emerge are essential shapers of their social environments, which may have significant consequences for health. The structure and features of connections among individuals in a society define the social environment. Social networks, social capital, segregation, and the social support provided by interpersonal encounters are all components of the social environment. Several of these characteristics have comprehensive definition. By a number of mechanisms, social surroundings may both promote and harm health. Social norms in highly populated metropolitan settings, for example, might encourage health-related activities such as smoking, nutrition, exercise, and sexual activity King and others. Social supports may reduce the effect of everyday stresses and give access to health-promoting goods and services for example, housing, food, and informal health care. Social segregation, particularly along racial or ethnic and socioeconomic lines, has been linked to worse health in cities. There are several ideas that explain the mutual link between the urban social environment and health. According to social learning theory, individuals turn to their social networks, peer groups, and role models to help them establish behaviour and make personal decisions.

This has significant consequences in metropolitan settings, where social networks may be dense and either useful or harmful to health. Moreover, city dwellers share a variety of common goods, ranging from physical assets like parks to social assets like collective effectiveness and social capital. Social capital is defined as resources that promote collective activity, enforce standards, and foster reciprocity. It serves as a framework for individual social networks and is especially important in highly crowded metropolitan settings, where the conduct of others has a significantly greater impact on everyday standards than in sparsely inhabited places. Empirical research have demonstrated that social capital is related to health; this may be particularly true in the dense social settings of cities.

Social comparison theory, which outlines how individuals constantly compare themselves to others, is equally pertinent to urban living. This comparison may cause individuals to attempt to copy others, to forsake the competition, or to respond in other ways. Comparing cities to other group norms is quite simple. According to Jencks and Mayer 1990, in the urban milieu, teenagers who make social

comparisons and see restricted prospects may react by creating gangs that perpetuate violence. Urban areas are often densely developed, rely on bro systems for water and food distribution, and rely on housing that is frequently inadequate in less rich nations. According, the major difference between the twentieth century and prior centuries, and cities and nonurban regions, is the degree to which people have been the dominant impact on the external surroundings. As cities develop, so do the physical aspects of the environment that might impact health. Roads and streets have the potential to contaminate water via runoff, damage green space, impact motor vehicle usage and injury levels, and contribute to the urban heat island effect see Chapter Eleven. The physical environment includes urban infrastructure, which influences how a city supplies water, disposes of rubbish, and provides electricity. When this costly infrastructure matures during a time of dwindling municipal resources, malfunctions may occur, producing health issues connected to water, sewage, or solid waste disposal. Metropolis infrastructure such as bridges and skyscrapers, depending on their design, may be susceptible to natural or man-made catastrophes, as the September 11, 2001, terrorist attacks on New York City proved. Additional health dangers include hazardous waste dumps, which are often found in or near metropolitan areas and may be linked to risks of low birthweight, birth abnormalities, and cancer.

The ability of the urban physical environment to affect health may vary greatly from city to city. Water and sanitation are likely to be the most important physical environment aspects of a city in a less rich nation. According to the most current global burden of disease assessment, contaminated water and inadequate sanitation and hygiene account for about 6% of the disease burden in high-mortality emerging nations mainly via infectious illnesses, outweighing all but two other possible risks Ezzati and others, 2002. In light of this discovery, creating good water and sanitation services in cities in less-developed nations is a clear public health priority that, if executed correctly, has the potential to save millions of lives each year. Developing adequate water and sanitation systems, on the other hand, costs time and money. Moreover, motor vehicle mortality is substantially greater in low-income locations than in high-income regions, often as a direct result of rapidly expanding vehicular traffic, poor road conditions, and permissive driving standards. Thirteen and twenty-five. Investment in road infrastructure is thus vital in low-income metropolitan areas, but it is often not made in cities that are already under significant financial hardship.

The physical environment of cities in affluent nations may have an impact on health due to poor air quality, noise pollution, or insufficient housing. In many highly populated, relatively small cities, insufficient housing is a major concern. Insufficient housing may be linked to lead paint exposure, moulds, or dangerous structural flaws. Homelessness is typically coupled with housing shortages, which indicates a variety of health issues, including significant early mortality. In contrast, in cities or sections of cities characterized by suburban expansion, physical factors such as insufficient public transit, a lack of chances for physical exercise, and a scarcity of shared green space may pose significant health hazards. Insufficient public transit may considerably restrict the mobility and health habits of the elderly; lack of sidewalks and local attractions can make walking difficult; and inadequate park space can contribute to the degradation of social capital, all of which have negative health consequences Understanding the influence of the physical environment necessitates a grasp of the unique conditions of each city.

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Current research methodologies have enabled a more thorough empirical investigation of the consequences of city life on health. This research have varied, with some indicating health advantages and others implying the reverse. For example, research have shown that cities have both a greater and lower frequency of mental health disorders than nonurban locations. Such parallels, however, suffer from oversimplification of what is very certainly a complex connection. Cities may have an impact on health, however the overall link between cities and health is probable because of the following:

a variety of previously described aspects demographic factors and social and physical environment characteristics. Living in a certain city may expose you to health-threatening exposures and experiences, such as violence and air pollution, but it may also provide key health advantages, such as improved social supports and social services. Hence, asking how a city influences general health is clearly a simplified approach to a broader, more difficult subject.

Injuries

Injuries are a significant cause of lost years of healthy life globally see also Chapters Thirteen and Twenty-Five. Intentional injuries including suicide, murder, and war cause the same amount of lost DALYs as TB, but unintentional injuries cause more lost DALYs than cardiovascular disease or cancer. In poor nations, injuries accounted for more than one-third of all DALYs lost among males aged 15 to 44 in 1990 Several aspects of urban surroundings may have an impact on injury morbidity and death. In most regions of the globe, violence is a significant source of intentional harm, and violence is more widespread in big cities than in nonurban areas. Violence in cities is prevalent among young males in low-income communities. In So Paulo, for example, low-income males aged fifteen to twenty-four are more than five times more likely than high-income men to be murder victims Grant and others, 1999. Homicide rates for young males in New York City have been higher in low-income communities for decades Karpati and others. Social theorists have given theories for why violence is more prevalent in cities. According to social disorganization theory, displays of physical disorder in cities broken windows inspire acts of violence and risky sex Despite the scarcity of empirical study in the field, current research has shown that collective effectiveness, or residents

Capacity and willingness to intervene to curb aberrant conduct, which protects against neighborhood violence This shows that socioeconomic variables at the neighborhood level may account for some of the observed disparities in murder rates across cities and between cities and nonurban regions. To comprehend the probable link between urban life and purposeful violence, we must evaluate several features of the city. Intergroup tensions and subsequent violence may be influenced by demographic characteristics such as population density and racial or ethnic segregation. The physical environment, including building and street design, the existence or lack of settings for safe leisure, and the availability of social services, especially medical care for victims of violence, may all be essential. The relative balance of these elements will most certainly change across cities, and public health experts must determine the features of urban life that increase intentional injury risk in each location.

In terms of unintended harm, urban inhabitants may be more vulnerable than rural ones, while data is inconsistent. The elements at work here may vary from those that are significant in deliberate injury. Motor vehicle incidents cause the great majority of unintended injuries and almost half of all trauma-related hospital admissions worldwide. Several variables contribute to these injuries, including the number and condition of roads, the enforcement of driving restrictions, and the usage of alcohol while driving, all of which vary across cities and between urban and nonurban locations. Moreover, depending on the social norms that impact driving in each place, the morbidity from accidental injury may vary by gender and racial or ethnic group [9]–[12]. A lethal drug overdose is another example of unintended damage. Research from New York City reveals that urban neighborhood features are connected with the incidence of overdose in cities Once again, a variety of urban elements may be connected with risk. These may include population factors such as the spread of drug use through social networks, which may make the means to injure oneself available; social norms influencing drug use; and physical environments such as boarded-up buildings and empty lots, which provide opportunities for illicit drug use. The urban

circumstances that influence injury risk are dynamic. The process of being urbanised may be a significant factor of harm in and of itself. Rapid urbanization, for example, may result in a significant rise in road traffic as employees commute from suburbs to city centres. If the current road network cannot handle the level of traffic, fast urban expansion and the consequent pressures on infrastructure is a major cause in urban motor vehicle collisions. As a result, both the qualities of the city at different moments in time and the characteristics of urbanization might influence population health.

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