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Pollution and Human Well-being: What Do We Know?

Maryam Moradbeigi[1]* and Siong Hook Lawb[2]

[1]*Taylor's University, Malaysia*

[2]*Department of Economics, Universiti Putra Malaysia, Malaysia*

***Corresponding author:** Maryam Moradbeigi, Taylor's Business School, Taylor's University, Subang Jaya, Selangor-47500, Malaysia, Tel: +603-56295670; Email: Maryam.Moradbeigi@taylors.edu.my

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Abstract

Global warming, climate changes and environmental pollution are becoming the major global concerns. Rising environmental pollution threatens human's health and hamper economic development through dampening labor productivity and the pace of human capital development. Therefore, tackling the unparalleled environmental problems is important to decrease health costs and sustain growth. This paper reviews the literature on the effect of pollution on different dimensions of human well-being by synthesizing what literature highlights about the impact of pollution on health, the association between education and productivity as well as pollution, and finally the link between life satisfaction and pollution exposure.

Keywords: Pollution; Productivity; Education; Human capital; Life satisfaction

Introduction

Human development is affected by environment through two channels, i.e. health and level of income. The substantial negative impact of polluted air, soil and water on human health is a great concern, especially in fast growing economies. For an instance, the health diseases caused by air and water pollution is estimated to cost China the amount equalled 4.3 percent if its GDP [1]. The developed economies are not far behind this trend. The health cost of air pollution in Europe is USD$1.6 trillion a year [2]. Polluted soil and water are also sources of human health problems such as cardiovascular and respiratory disorders, diarrhoea, malaria, dengue fever, and schistosomiasis. From economic point of view, pollution has negative association with macroeconomic variables such as labour supply and productivity.

All types of pollution are result of negative market externalities for which free market failed to efficiently allocate the resources. The cost of negative externalities has a direct relationship with economic activities. Therefore, it is expected that pollution of raises with economic growth if an economy failed to internalises the cost of negative externalities. Therefore, sustainable growth calls for reducing the environmental pollution which has become one of top priorities of most countries. Considering the high cost of internalizing the externalities to industry, optimal environmental policies require estimating the cost of pollution on human well-being. Focusing on the outcome of pollution may be of great help to understand the benefits of reducing pollution. This paper provides a short review of literature of the effect of pollution on health, labour productivity, education and human capital as well as life satisfaction and happiness in sections 2,3,4, and 5, respectively.

Health

Health is the important dimension of human capital that can be affected by environment. Previous researches indicate the significant negative impact of air, water and soil pollution on human health. The World Health Organization reports that one out of eight deaths in 2012 occurred because of air pollution exposure [3]. Based on Environmental Protection Agency report, Deterioration of lung function, increasing cardiovascular illnesses, such as strokes and ischaemic heart disease, increased respiratory problems, and angina are some of the health problems resulting from the short-run exposure to the air pollution [4].

Long-run exposure to the air pollution increases asthma admissions by 5-14% among 1-18 years old children [5]. This effect was more significant among children belonged to families with lower socio-economic status [5]. It is also shown that the air pollution resulted from 1981-82 recession caused the death of 2500 infants [6]. This indicates the positive association between infant mortality and air pollution. It was also documented that the exposure acute fine particulate matter (PM2.5) was positively linked with elderly mortality rate [7]. Cardiopulmonary diseases, respiratory infections and lung cancer were found to be other consequences of air pollution [4]. While some of the health problems resulted from pollution can last for as long as ten years, the long-term effect of air pollution on men and women is more significant that children

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whom appeared to recover faster and fully [8]. Pollution not only can be a threat to physical health of human being but also can cause severe mental and physiological well-being such as high anxiety and emotional instability [9,10]. There was negative association between PM2.5 and CO and standard test scores among Israeli high school students because of higher asthma problem and damaging neurological functioning, respectively [9]. It is also shown that PM2.5 increases the anxiety symptoms and depressive symptoms among American by 180-days moving average and 30-days moving average, respectively [10].

The positive effect of better air quantity on lower infant mortality rate has been found in several studies [6,11-14]. While better quality of air can be responsible for less respiratory disorders in infants and adults [15,16], its positive effect on mental health and cognition is also shown [17].

Labour Productivity

One of the important questions that have been addressed by researchers is the impact of pollution on the short-run as well as long-run labour. Health problem can be a transmission channel for the short-run negative effect of pollution on both labour supply [18-21] and productivity [22,23]. Pollution exposure in early life would cause lower labor participation as well as lower income at the age of 30 [21]. The short-run elasticity of work hour for Mexican with respect to SO2 was estimated to be between -0.43 to -0.67 [19]. This is because the exposure can lead to lower physical strength and missing work days. The reduced working hours due to PM2.5 was shown to be more serious among working adults how had children or elderly to look after [18], indicating that working adults get absent from work to take care of exposed children or elderlies to the pollution. It is also suggested that the exposure to air pollution reduces life expectancy by 5.5 years, which, in turn, forces firms to replace senior labours more often which results in lower productivity [24].

The adverse relationship between air pollution and short-run labour productivity in specific occupations has been demonstrated by several researches. These studies revealed that 10 micrograms per cubic meter (μg/m3) increase in PM2.5 decreased the workers productivity of pear packing workers in California by $0.41 per hour [23], Indian garment assembly industry by more than 0.3 percentage [25] and labours in tow textile sites in China by 0.5 to 3 percentage of mean daily output [26]. A decrease of 10 parts per billion (ppb) in ozone is associated with 5.5 percent worker productivity enhancement for California fruit pickers [27]. The number of daily calls handled by labour in call centre services in China decreased by 0.35 percent when the air pollution index (API) increased by 10units [22].

Other researchers do not limit themselves into particular industry and try to answer the question how pollution affect labour supply and productivity as a whole. Comprehensive evidences of the negative impact of air pollution on Chinese manufacturing labor productivity in the short-run have been provided [28]. They also evident that better air quality substantially enhances manufacturing outputs resulting from higher labour productivity. In a natural experiment, it is shown that the long lasting (ten years) adverse effect of air pollution on labor supply in Indonesia [8].

Education and Human Capital

Recent empirical researches shed light on our understanding of the negative impacts of pollution on educational achievements and, thus, the formation of human capital. Students' success may decline because of oxygen deterioration, health problems (such as asthma attacks, fatigue, headaches, etc.) and high absents from school [29] induced by pollution.

The high school students in Texas whose mathers have been exposed to the ambient air pollution during birth performed poorly in the exit exam [30]. The similar result is reported for receiving among high school qualification students in London in 1952 [31]. Chilean fourth grade students' performance was significantly poor in mathematics and language among students whom their mothers expose to carbon monoxide during pregnancy [32]. In addition, air pollution has been found to account for reduction in students' cognitive performances and their score in various tests [9,33-35].

Life Satisfaction and Happiness

How does the quality of environment affect the welfare of human being? There has been deviation from conventional approach (such as using Gross Domestic Product (GDP) or income as proxie for welfare) towards subjective well-being (such as life satisfaction and happiness) among researchers to address mentioned equation. Therefore, a broad range of researches investigate the relationship between pollution and life satisfaction, controlling for other scoio-economic factors. The negative impact of pollution on life satisfaction has been strongly evident in both country level researches [14,36-41] and cross-sectional studies [42-46].

Conclusion

Environmental quality has deeply affected multi dimension of human well-being, including health, education, human capital formation and productivity. The significant air, water and soil pollution after industrial revolution has been rooting on human activities and it will not reverse unless policy makers implement appropriate environmental regulations. However, it is important to emphasize that implementing the regulation comes at its own costs (such as production costs), which may in return affect other aspects like education indirectly. These costs must be considered by policy makers when deciding how tight the environmental regulation has to be.

Academic and researchers have utilized variety of methods to evaluate the effect of pollution on human being. However, most of existing literature focuses mainly on the short-run effect. To make more efficient policies, understanding the long-lasting impact of pollution is extremely important. In addition, researchers say minimum about the transmission mechanism through which

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pollution affect human well-being. This is important particularly because different channels require taking different policies.

References

1. World Bank (2007) Cost of pollution in China, economic estimates of the physical damages. State Environmental Protection Administration.
2. WHO, OECD (2015) Economic cost of the health impact of air pollution in Europe: Clean air, health and wealth. Copenhagen. WHO Regional Office for Europe, Europe.
3. WHO (2014) 7 million premature deaths annually linked to air pollution.
4. EPA (2004) Air quality criteria for particulate matter. EPA pp. 1-99.
5. Neidell MJ (2004) Air pollution, health, and socio-economic status : the effect of outdoor air quality on childhood asthma. Journal of Health Economics 23(6): 1209-1236.
6. Chay KY, Greenstone M (2003) The impact of air pollution on infant mortality: evidence from geographic variation in pollution shocks induced by a recession. The Quarterly Journal of Economics 118(3): 1121-1167.
7. Deryugina T, Heutel J, Miller NH, Molitor D, Reif J (2016) The mortality and medical costs of air pollution: evidence from changes in wind direction. NBER p. 22796.
8. Kim Y, Knowles S, Manley J, Radoias V (2016) Long-run health consequences of air pollution: evidence from Indonesia's forest fires of 1997. Economics & Human Biology 26: 186-198.
9. Lavy V, Ebenstein A, Roth S (2014) The impact of short term exposure to ambient air pollution on cognitive performance and human capital formation. NBER p. 20648.
10. Pun VC, Manjourides J, Suh H (2017) Association of ambient air pollution with depressive and anxiety symptoms in older adults: results from the NSHAP study. Environmental Health Perspectives 125(3): 342-348.
11. Bobak M, Leon DA (1992) Air pollution and infant mortality in the Czech Republic, 1986-88. The Lancet 340(8826): 1010-1014.
12. Currie J, Hanushek EA, Kahn EM, Neidell M, Rivkin SG (2009) Does pollution increase school absences? The Review of Economics and Statistics 91: 682-694.
13. Kenneth YC, Greenstone M (2003) The impact of air pollution on infant mortality : Evidence from geographic variation in pollution shocks induced by a recession. The Quarterly Journal of Economics 118(3): 1121-1167.
14. Luechinger S (2009) Valuing air quality using the life satisfaction approach. The Economic Journal 119(536): 482-515.
15. Chauhan AJ, Johnston SL (2003) Air pollution and infection in respiratory illness. British Medical Bulletin 68(1): 95-112.
16. Emmanuel SC (2000) Impact to lung health of haze from forest fires: the Singapore experience. Respirology 5(2): 175-182.
17. Peterson BS, Rauh VA, Bansal R, Hao X, Toth Z , et al. (2015) Effects of prenatal exposure to air pollutants (polycyclic aromatic hydrocarbons) on the development of brain white matter, cognition, and behavior in later childhood. JAMA psychiatry 72(6): 531-540.
18. Aragon FM, Miranda JJ, Oliva P (2016) Particulate matter and labor supply: evidence from Peru. Simon Fraser University Economics Working Paper, Canada.
19. Hanna R, Oliva P (2015) The effect of pollution on labor supply: evidence from a natural experiment in Mexico City. Journal of Public Economics 122: 68-79.
20. Hausman J, Ostro BD, Wise DA (1984) Air pollution and lost work. National Bureau of Economic Research Cambridge, USA.
21. Isen A, Slater MR, Walker WR (2017) Every breath you take-every dollar you'll make: The long-term consequences of the Clean Air Act of 1970. Journal of Political Economy 125(3): 848-902.
22. Chang T, Zivin JG, Gross T, Neidell M (2016) Particulate pollution and the productivity of pear packers. American Economic Journal: Economic Policy 8(3): 141-169.
23. Chang T, Neidell M, Chang T (2016) The effect of pollution on worker productivity: evidence from call-center workers in China. NBER p. 22328.
24. Chen YA, Greenstone EM, Lie H (2013) Evidence on the impact of sustained exposure to air pollution on life expectancy from China's huai river policy. Proceedings of the National Academy of Sciences of the United States of America 110: 12936-12941.
25. Adhvaryu A, Kala N, Nyshadham A (2014) Management and shocks to worker productivity: evidence from air pollution exposure in an Indian garment factory. University of Michigan, USA.
26. He J, Liu H, Salvo A (2016) Severe air pollution and labor productivity: evidence from industrial towns in China. IZA DP p. 8916.
27. Zivin JG, Neidell M (2012) The impact of pollution on worker productivity. The American Economic Review 102(7): 3652-3673.
28. Fu S, Brian V, Zhang P (2017) Air quality and manufacturing firm productivity: comprehensive evidence from China. MPRA p. 78914.
29. Currie J, Neidell M (2005) Air pollution and infant health: what can we learn from California's recent experience? The Quarterly Journal of Economics 120(3): 1003-1030.
30. Sanders NJ (2012) What doesn't kill you makes you weaker prenatal pollution exposure and educational outcomes. Journal of Human Resources 47(3): 826-850.
31. Ball A (2014) Air pollution, foetal mortality, and long-term health: evidence from the great London smog. MPRA p. 63229.
32. Bharadwaj P, Gibson M, Zivin JG, Neilson C (2017) Gray matters: fetal pollution exposure and human capital formation. Journal of the Association of Environmental and Resource Economists 4(2): 505-542.
33. Ebenstein A, Lavy V, Roth S (2016) The long-run economic consequences of high-stakes examinations: evidence from transitory variation in pollution. American Economic Journal: Applied Economics 8(4): 36-65.
34. Ham JC, Zweig JS, Avol E (2014) Pollution, test scores and distribution of academic achievement: evidence from California schools 2002-2008: 1-41.
35. Roth S (2017) Air pollution, educational achievements, and human capital formation. IZA World of Labor: 381.
36. Ferreira S, Akay A, Brereton F, Cuñado J, Martinsson P, Moro M, Ningal TF (2013) Life satisfaction and air quality in Europe. Ecological Economics 88: 1-10.
37. Ferreira S, Moro M (2010) On the use of subjective well-being data for environmental valuation. Environmental and Resource Economics 46(3): 249-273.
38. Giovanis E, Ozdamar O (2016) Structural equation modelling and the causal effect of permanent income on life satisfaction: the case of air pollution valuation in Switzerland. Journal of Economic Surveys 30(3): 430-459.
39. Levinson A (2012) Valuing public goods using happiness data: The case of air quality. Journal of Public Economics 96(9-10): 869-880.
40. MacKerron G, Mourato S (2009) Life satisfaction and air quality in London. Ecological Economics 68(5): 1441-1453.
41. Rehdanz K, Maddison D (2008) Local environmental quality and life-satisfaction in Germany. Ecological Economics 64(4): 787-797.

42. Luechinger S (2010) Life satisfaction and transboundary air pollution. Economics Letters 107(1): 4-6.

43. Welsch H (2002) Preferences over prosperity and pollution: Environmental valuation based on happiness surveys. Kyklos 55(4): 473-494.

44. Welsch H (2006) Environment and happiness: Valuation of air pollution using life satisfaction data. Ecological Economics 58(4): 801-813.

45. Kim Y, Manley J, Radoias V (2017) Medium- and long-term consequences of pollution on labour supply: evidence from Indonesia. IZA 6(2): 5.

46. Loomis D, Castillejos M, Gold DR, McDonnell W, Aburto VHB (1999) Air pollution and infant mortality in Mexico city. Epidemiology 10(2): 118-123.

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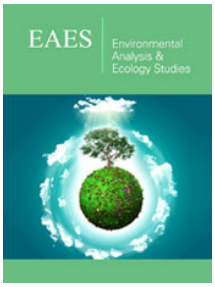

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