
Commentary

Environment and health in South Africa: Gains, losses, and opportunities

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Abstract South Africans face a range of preventable environmental hazards to their health, many of which are rooted in the country's colonial and apartheid past, and ongoing poverty and inequality. Since the advent of democracy in the country, government has made considerable progress in improving living conditions and in developing the legal framework to prevent and manage environmental contamination. Considerable, under-exploited potential also exists in South Africa to prevent disease, including infectious and chronic diseases, and to promote health through a more holistic and public health approach. This article summarizes the main environmental health concerns and reflects on mechanisms and opportunities to improve public environmental health.

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Introduction

Environmental factors affect health through multiple pathways of exposure to biological, physical, and chemical substances. The World Health Organization (WHO) estimated that one-quarter of the global burden of disease is attributable to environmental factors.¹ In children under 5 years, for example, one-third of all disease is caused by environmental factors such as unsafe water and air pollution, and there is growing recognition of the role that environmental factors play in cancer development.² People in developing countries face multiple burdens of ill health, with a substantial portion of these burdens

attributable to environmental factors. South Africa is described as having a quadruple burden of disease: communicable, non-communicable, perinatal and maternal, and injury-related disorders;³ environmental factors potentially play a role in each of these. This commentary highlights the main environmental health challenges in South Africa, and reflects on existing mechanisms and opportunities to improve public environmental health.

Colonialism and Apartheid: The Environmental Legacy

The current distribution of environmental exposures in South Africa continues to a large extent to be rooted in its colonial and apartheid past, which was characterized by racially based segregation, and marked inequalities. During the apartheid era, government restricted the majority of the black population to rural homelands typified by poverty, overcrowding, and unsanitary living conditions.⁴ Following the discovery of gold in Johannesburg in 1886, black miners lived mainly in overcrowded and squalid inner city settlements. An outbreak of bubonic plague in 1904 spurred the authorities to torch the area and relocate Blacks to townships such as Soweto, well away from places of work. Township housing comprised mainly of corrugated iron shacks or ‘matchbox’ houses, often made from hazardous materials such as asbestos⁵ and lead-based paint.⁶ These houses were usually constructed without bathrooms, supplied only with the detested and hazardous ‘bucket’ toilet system, and had limited access to water and sanitation. The worst form of apartheid housing was probably the dormitory style ‘hostels’ that the mining industry provided for its workers, where all amenities were communal and privacy severely curtailed.

In the post-apartheid era, hundreds of thousands of households in South Africa benefited from improved living conditions resulting from construction of new housing, improved water supplies, sanitation services, and electrification initiatives. The commitment of government to respond to the huge demand for housing provides an important opportunity to build healthy and sustainable neighborhoods for communities. Yet, the housing backlog has grown from 1.5 million in 1994 to 2.1 million in 2010, and there are now more than 2700 informal settlements across the country.⁷ Studies also show that preventable conditions strongly associated with poor housing quality, such as diarrhea and pneumonia, continue to count among the top five



killers of South African children.⁸ Apart from the HIV epidemic, ongoing poverty is an important contributor to poor health. A study of electrification and exposure to indoor air pollution in a rural area in the North West province showed that more than three years after being supplied with electricity, around 80 per cent of households had not yet been able to afford an electrical stove, and were continuing to use wood and crop waste for daily cooking,^{9,10} resulting in increased exposure to indoor air pollution and an elevated risk of pneumonia.

A long-term urban health surveillance study (the Health, Environment and Development, or 'HEAD' study) currently underway in five relatively impoverished neighborhoods in Johannesburg¹¹ also points to growing hunger and food insecurity, high levels of violence,¹² widespread mental ill health,¹³ low levels of physical activity, and high levels of chronic diseases. These findings confirm the national picture of multiple, simultaneous disease burdens,^{3,14} and the conclusion of WHO's Commission on the Social Determinants of Health (CSDH) that health cannot thrive in environments of poverty and inequality. The CSDH suggests that improvements in living conditions are important, but that the social determinants of health, including poverty and inequality, also need to be tackled.^{15,16} In this regard, seemingly the South African government clearly understands that:

Human settlement is not just about building houses. It is about transforming our cities and towns, and building cohesive, sustainable and caring communities with closer access to work and social amenities, including sports and recreation facilities.¹⁷

In order to translate this understanding into reality, there is a need in South Africa to escalate investment in settlement development, while simultaneously to ensure that the planning and design of such settlements maximize opportunities to prevent disease, promote health, and facilitate the ability of people to reach their full potential in life. Health departments must build capacity to engage effectively with non-health sectors. In terms of the predicted epidemic of chronic diseases (and its underlying basis in physical inactivity), there is much to be gained from stronger relationships between health and non-health sectors to ensure that the design of new settlements (and retrofits for established settlements) encourage daily physical activity through: sufficient open space, public parks, sporting and recreation infrastructure, pedestrian

and cycling paths, public transport, street lighting, violence prevention and policing measures, and shops within walking distance that supply daily needs for milk, fruit, newspapers, and other items (neighborhood ‘walkability’).

Environmental Health: The Industrial Legacy

The mainstays of the South African economy have long included mining and agriculture. While these sources of national income have created wealth for a minority, they have also imposed a legacy of environmental contamination and degradation on some of the poorest sectors of the population. Some notable examples illustrate broader concerns. A study at the lead mining town of Aggeneys in the Northern Cape province showed that lead poisoning in children was more widespread in this town than in a nearby non-mining town.¹⁸ In 1990, concerns were raised over contamination and worker deaths at a mercury waste processing plant in the province of KwaZulu Natal.¹⁹ Recent studies continue to point to environmental contamination around the site, and elevated hair mercury levels in poor communities living around a dam downstream from the same plant.²⁰ Researchers have also drawn attention to poor pesticide management practices on farms and the risk of long-term health consequences, suicide, and unintentional poisoning in agricultural settings in South Africa.²¹ More recently there has been growing alarm, and increased media attention devoted to large-scale acid mine drainage in several parts of the country (especially in and around Johannesburg), and the potential implications for water quality and human exposure to toxic metals.²² Strong criticism by environmental groups pointed to the apparent lack of political will to address the problem and government’s delay in mounting an effective response.

Environmental Health Policy in Recent Decades

The transition to democracy in South Africa led to increased development of legislation and policies designed to protect the environment and public environmental health. The South African constitution guarantees the right to a safe and healthy environment, and new legislation has been promulgated to protect or enhance environmental quality such as the National Environmental Management and Air



Quality Acts. The country is a signatory to a wide range of international agreements and protocols including the United Nations Framework Convention on Climate Change, the Montreal Protocol (ozone depletion), and the Basel Convention dealing with control of trans-boundary movements of hazardous waste. Government banned use of asbestos in homes, phased out leaded petrol, and regulated the use of lead in paint. Through the Tobacco Products Control Act of 1993 and participation in the Framework Convention on Tobacco Control, South Africa became a global leader in prevention of exposure to environmental tobacco smoke. Moreover, environmental impact assessments are now a prerequisite for large industrial developments.

Environmental Health in South Africa: Grasping Opportunities

Environmental factors have a role to play across the spectrum of the quadruple burden of ill health that presently characterizes South Africa. Nearly two decades after the dismantling of apartheid, an assessment of the environmental health situation in South Africa shows a mixed picture of gains and lost opportunities. On the positive side there has been much progress made in building the legal framework needed to prevent environmental pollution, and to act against polluters. However, too many communities in South Africa still continue to face exposure to hazards such as polluted air,²³ lead, and mercury from industrial and other sources. Such exposures might be avoided with adequate political will and institutional capacity to enforce the existing legislation, thereby preventing environmental contamination and ensuring cleaning of contaminated areas.²⁴ An important requirement for the prevention of further environmental exposures in South Africa, within a context of increasing economic growth and poverty reduction, is the need for health to be central to sustainable development and planning. The Implementation Plan of the World Summit on Sustainable Development held in Johannesburg in 2002 emphasized this and called for creation of more effective national and regional policy responses to environmental threats to health,²⁵ which may include inter-sectoral action, integrated monitoring and surveillance systems, health impact assessment procedures, and a re-evaluation of the role of the health sector in achieving high levels of environmental health.

Since housing and the quality of living environments are powerful determinants of public health, it is important that current accelerated housing delivery programs in South Africa be seen as an opportunity to design and build neighborhoods that promote and enhance health. South Africa needs a holistic approach to settlement development, one that recognizes the role that environmental planning and design could play in preventing exposure to environmental hazards. History provides strong motivation for greater effort: remarkable reductions in cholera, typhoid, and other infectious diseases in nineteenth century United Kingdom and United States of America occurred as a consequence of close working relationships between planners, engineers, and the health sector.²⁶

Given the inextricable links between environmental exposures and poverty, and the findings of the CSDH,¹⁶ achieving high levels of improvement in environmental health are unlikely if we do not tackle poverty and the wide gap in South Africa between the rich and the poor.

About the Author

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References

1. Prüss-Üstün, A., Bonjour, S. and Corvalán, C. (2008) The impact of the environment on health by country: A meta-synthesis. *Environmental Health* 7: article 7, doi:10.1186/1476-069X-7-7.
2. Irigaray, P. *et al* (2007) Lifestyle-related factors and environmental agents causing cancer: An overview. *Biomedicine & Pharmacotherapy* 61(10): 640–658.
3. Mayosi, B.M., Flisher, A.J., Lalloo, U.G., Sitas, F., Tollman, S.M. and Bradshaw, D. (2009) The burden of non-communicable diseases in South Africa. *Lancet* 374(9693): 934–947.
4. Coovadia, H., Jewkes, R., Barron, P., Sanders, D. and McIntyre, D. (2009) The health and health system of South Africa: Historical roots of current public health challenges. *Lancet* 374(9692): 817–834.
5. Mathee, A., von Schirnding, Y.E.R., de Wet, T. and Mokoetle, K. (2000) Potential risk factors for asbestos exposure amongst six-month-old infants living in the township of Soweto, South Africa. *International Journal of Environmental Health Research* 10(2): 135–139.
6. Mathee, A., Röllin, H., Levin, J. and Naik, I. (2007) Lead in paint: Three decades later and still a hazard for African children? *Environmental Health Perspectives* 115(3): 321–322.



7. Sexwale, T. (2010) Budget Speech by the Minister of Human Settlements. Cape Town, 21 April.
8. Bradshaw, D., Bourne, D. and Nannan, N. (2003) What are the leading causes of death among South African children? MRC Policy Brief no. 3, <http://www.mrc.ac.za/bod/bod.htm>.
9. Mathee, A. and de Wet, T. (2001) Rural electrification in South Africa: Implications for the health and quality of life of women. *Energia News* 4(4): 20–22.
10. Röllin, H.B., Mathee, A., Bruce, N., Levin, J. and von Schirnding, Y.E.R. (2004) Comparison of indoor air quality in electrified and un-electrified dwellings in rural South African villages. *Indoor Air* 14(3): 208–216.
11. Mathee, A. *et al* (2009) Overcoming fieldwork challenges in urban health research in developing countries: A research note. *International Journal of Social Research Methodology* 13(2): 171–178.
12. Naicker, N., Mathee, A., Barnes, B., Swart, A. and Naidoo, S. (2010) The prevalence and health implications of violence in impoverished communities in Johannesburg. *Southern African Journal of Epidemiology and Infection* 25(4): 41–46.
13. Plagerson, S., Patel, V., Harpham, T., Kielmann, K. and Mathee, A. (2010) Does money matter for mental health? Evidence from the child support grants in Johannesburg, South Africa. *Global Public Health*, doi:10.1080/17441692.2010.516267.
14. Seedat, M., Van Niekerk, A., Jewkes, R., Suffla, S. and Ratele, K. (2009) Violence and injuries in South Africa: Prioritizing an agenda for prevention. *Lancet* 374(9694): 1011–1022.
15. Marmot, M. (2005) Social determinants of health inequalities. *Lancet* 365(9464): 1099–1104.
16. Commission on Social Determinants of Health. (2008) Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health. Geneva: World Health Organization. Final Report of the Commission on Social Determinants of Health.
17. Zuma, J. (2009) State of the Nation Address by Jacob Zuma, President of the Republic of South Africa. Cape Town, 3 June, <http://www.info.gov.za/speeches/2009/09060310551001.htm>.
18. von Schirnding, Y.E.R., Mathee, A., Kibel, M., Robertson, P., Strauss, N. and Blignaut, R. (2003) A study of pediatric blood lead levels in a lead mining area in South Africa. *Environmental Research* 93: 259–263.
19. Oosthuizen, J. and Ehrlich, R. (2001) The impact of pollution from a mercury processing plant in KwaZulu-natal, South Africa on the health of fish-eating communities in the area: An environmental health risk assessment. *International Journal of Environmental Health Research* 11: 41–50.
20. Papu-Zamxaka, V. *et al* (2010) Elevated mercury exposure in communities living alongside the Inanda Dam, South Africa. *Journal of Environmental Monitoring* 12: 472–477.
21. London, L. and Rother, H.-A. (2000) People, pesticides and the environment: Who bears the brunt of backward policy in South Africa? *New Solutions: A Journal of Environmental and Occupational Health Policy* 10(4): 339–350.
22. Naicker, K., Cukrowska, E. and McCarthy, T.S. (2003) Acid mine drainage arising from gold mining activity in Johannesburg, South Africa and environs. *Environmental Pollution* 122: 29–40.
23. Mathee, A. and von Schirnding, Y. (2003) Air quality and health in Greater Johannesburg. In: G. McGranahan and F. Murray (eds.) *Air Pollution and Health in Developing Countries*. London: Earthscan Publications.
24. Papu-Zamxaka, V., Harpham, T. and Mathee, A. (2010) Environmental legislation and contamination: The gap between theory and reality in South Africa. *Journal of Environmental Management* 91(11): 2275–2280.
25. von Schirnding, Y. (2005) The world summit on sustainable development: Reaffirming the centrality of health. *Globalization and Health* 1: article 8, doi:10.1186/1744-8603-1-8.
26. Corburn, J. (2004) Confronting the challenges in reconnecting urban planning and public health. *American Journal of Public Health* 94(4): 541–546.